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ORIGINAL ARTICLES.

THE IMPORTANCE OF SURGICAL MEANS APPLIED TO THE NASO-PHARYNX IN THE RELIEF OF NASO-PHARYNGEAL AND MIDDLE-EAR CATARRH.

Read in the Section of Laryngology and Otology at the Forty-first Annual Meeting of the American Medical Association, Nashville, Tenn., May, 1890.

BY C. W. RICHARDSON, M.D.,

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As a preface to the few remarks I am about to make I wish to offer a few words in explanation; not in apology. During the early part of the present year, at the invitation of your Secretary, I furnished him with the title of the present paper. Shortly after having written to Dr. Potter I received a copy of the *Journal of the Respiratory Organs*, containing that most excellent paper read by Dr. Daly before the New York Medical Society, carrying out, to some extent, the very idea and train of thought I intended following in presenting this subject for your consideration. I immediately wrote Dr. Potter requesting his permission to change my subject, to which he kindly consented, but, at the same time, urging me to continue its agitation. Concluding that the doctor's advice was well worthy of consideration, I decided to adhere to my original intention, and in a feeble way, lend my aid to the grand piece of "missionary work" already begun by that able exponent of rhinological wisdom, Dr. W. H. Daly.

In the presentation of this subject to-day it is not my intention to array the rhinologist against the otologist; but simply to insist upon the necessity of the thorough surgical treatment of certain conditions existing within the naso-pharyngeal cavities as an aid to the radical removal of, and in preventing the recurrence of, certain affections of the middle-ear. During the past decade the intimate relationship existing between, or rather dependence of, diseases of the middle-ear upon those of the naso-pharynx has been so thoroughly recognized as to cause a great increase to that class of specialists whose education, from its incipiency, has been such as to thoroughly imbue them with these ideas; whose education in the ear has been as thorough as in that of the nose and pharynx; whose education has been such as to cause them to view the diseases of the ear, in many cases, to be dependent upon an existing disease of these cavities; has caused them to search for these causes, to remove them when present, and thus thoroughly to relieve their patients, to this class of practitioners, and as an humble exponent of these ideas, I claim to belong. Dr. Daly in his presentation of the subject has handled the otologist from a rhinological point of view; and the otologists have accused him, and indirectly the rhinal surgeons, with an incomplete knowledge of diseases of the ear. These exponents having clashed arms it now remains for the auro-rhinologist to attempt to bring these warring factions to terms, bring harmony out of discord, and aid in showing the absolute necessity of the otologist being more of a rhinologist than ophthalmologist. I suggest that we aid in this good work because we are unbiased, we cannot be accused of wanting in knowledge of the use of the tuning fork; because, while being conservative, we do not hesitate in resorting to operative interference, when demanded; and, on account of having many ear cases presented primarily, we are better able to judge the relationship existing between diseases of the ear and those of the naso-pharynx.

During my short experience as an auro-rhinologist it has been my lot to have had under observation a number of aural cases that have previously sought relief at the hands of skilled auro-ophthalmologists in this vicinity and neighboring cities. These cases may be divided into two great classes, viz.: acute and chronic inflammation of the middle ear cavity. Among the acute cases were many of recurring middle-ear catarrh, non-suppurative and suppurative middle-ear inflammations. In all the above mentioned acute affections there existed various affections of the nasal and pharyngeal cavities, in many of which their existence was so patent as hardly to escape the eye of the most non-observing layman. In some cases the aurist, who has been usually an ophthalmologist, while recognizing some disturbance of the normal functions of the naso-pharyn-

geal cavity, failing to appreciate its nature, has applied for its relief unscientific, inadequate, or inappropriate treatment showing an utter disregard, want of knowledge, and frequent dread of the only proper therapeutic measure for the relief of the condition present, naso-pharyngeal surgery. The surgical treatment of these cavities would not have in view only the restoration of them to a normal condition, but also, by the light of our present knowledge, aid in a restoration of the impaired organ of audition, and, acting as a prophylactic agent, by removing the cause, prevent the recurrence of subsequent attacks. In many of the acute effections of the ear, in which there had been numerous recurrences, in the hands of otologists, I have almost universally found some affection of the naso-pharyngeal cavity the relief of which, by operative measures, not only aided in affecting a rapid recovery, but also produced an absolute immunity from subsequent attacks. These facts are so thoroughly acknowledged by all auro-rhinologists as to have become an aphorism—to cause me almost to apologize for having given it mention, but having done so I shall cite several cases to illustrate this point.

About two years ago I had placed under my care, by an otologist of Washington, a young woman who had frequent recurring attacks of middle-ear catarrh. One attack would hardly be relieved before another would supervene. For years she had been under medical care for this annoying deafness, but invariably found that though exerting all due care she was certain to find her efforts futile. My friend sent her to me that I might treat her throat, at the same time advising me to continue attention to the ears. He was the first medical attendant who had ever suggested the care to nose and pharynx. The pharynx was, with its thick padding of mucus, the most disgusting sight I have ever seen; the tonsils were enormously hypertrophied; the vault studded with stalactite-like hypertrophies; and the anterior and post-nasal orifices blocked by hypertrophies of inferior turbinates. The whole picture was changed within a few days by internasal and pharyngeal surgery. While patient was recovering from effects of active surgical procedures several inflations were made, and she was discharged, within a short period, with no catarrh of nose, pharynx or ear, and so remains at present writing.

Some time ago a patient was presented to me for examination. She had been under the care of various auro ophthalmologists for several years for a chronic suppuration of the right middle-ear, but not having obtained relief her parents had desisted in treatment. I found considerable glandular hypertrophy at vault of pharynx, and suggested the removal of the same as a possible means of aiding in the relief of the suppuration of the ear; as the child was about to leave town they did not consent to immediate treatment. Within six months an acute suppurative inflammation having occurred in the left ear patient was placed under my care. Removal of glandular hypertrophies at vault, with mild but effective treatment to ears, was followed within a few days with cessation of suppuration in the old, and within a couple of weeks in the recently affected one. I have seen this patient lately; hearing normal and no suppuration.

Several cases of chronic middle-ear catarrh have been under observation that have received the most decided negative prognosis from distinguished auro-ophthalmologists; in these I have found naso-pharyngeal disease of an obstructive character, the removal of which, with simultaneous and subsequent use of inflation, has been attended with the most satisfactory results. Acute inflammation of the middle-ear I seldom see without finding some obstructive disease of the nasal cavity or glandular hypertrophy at the vault of the pharynx. The simple treatment of the ear affection without any attempt to remove the producing cause, as is the course adopted by the majority of aurists, leaves the case half treated; it leaves the patient, to say the least, open to a recurrence at any moment. It would be unnecessary to give a long citation of individual cases drifting into our hands, who would show the insufficiency of simple otological treatment. In speaking as I do, I do so only with regard to the locality in which I live and its environs. In Washington and Baltimore the auro-ophthalmologist does not seem to recognize the great importance of naso-pharyngeal diseases as productive of affections of the ears. If they do, their actions belie their opinions, and one must acknowledge that they are rhinal therapeutic nihilists.

Obstructive disease in the naso-pharynx, hypertrophies, polypi, spurs, deflected septi, and hypertrophial glandular tissue at vault of pharynx, are the conditions usually observed by me as demanding treatment in most of the cases coming under my observation. The *modus operandi* in the production of disease of the middle-ear through obstructive disease of the naso-pharynx, whether by interfering with the ventilation of the middle-ear, by extension of catarrhal inflammation, by inflammatory infiltration into or paralysis of tubal muscles, are questions of minor importance as compared to the great truth, now universally acknowledged, that these conditions are productive of the affections mentioned, and that the only consistent, scientific, rational, and, therefore, proper treatment, consists in the primary removal of the causative agent as essential to the secondary treatment of disease thereby produced. Even should the above assertion be challenged in general, or as regards any individual case, one cannot but admit that many of these cases, in the hands of the aurist and auro-ophthalmologist are

allowed to continue suffering more or less inconvenience from unpleasant naso-pharyngeal affections which the auro-rhinologist would at once recognize, and, simultaneously with the aural affection, relieve. I cannot agree with the statement I have several times noted, made by a distinguished New York specialist, that atrophic rather than hypertrophic nasal catarrh is productive of the major proportion of middle-ear affections. Atrophic nasal catarrh, in which the nasal passages are extremely patulous, has presented the smallest per cent. of middle-ear affections in my practice.

In showing how inadequate the ordinary treatment of ear affections under the care of the auro-ophthalmologist is, I do not wish it to be understood that I am, to any extent, an aural nihilist. I am afraid a great many of my medical *confrères* are claiming too much for the independent use of the forceps, cautery, snare, drills and saw. I doubt very much of their curing all the ills to which the ear is subject unless they at the same time resort to a judicious use of aural therapeutic measures. Firmly convinced as I am of the value of naso-pharyngeal surgical methods, I have not yet thrown away the leech, douche, paracentesis knife, Pölitzer bag or catheter; our only safeguard is the judicious use of these means and the acknowledgment of their just therapeutic value. On the other hand, we must acknowledge the increased successfulness, or aid to success, in otological work rendered by the rhinal surgeon; but while acknowledging these achievements one must remember that there are a vast number of aural cases falling under our observation thoroughly independent of any change within the naso-pharyngeal cavity; the affection in the one being synchronous with but independent of the affection in the other; the relief of the one not arresting the retrogressive progress of the other. It is almost unnecessary for me to state that I refer to sclerotic changes within the tympanic cavity. These cases are usually present in persons manifesting little or no change in naso-pharyngeal cavity, with patulous tubes. What aid can the rhinologist here furnish? If the patient is to have relief it must be through aural therapeutic measures employed in the hand of the skilled otologist. It is nonsense for one to agitate ideas having in view the condemnation of otological therapeutic methods—they have a vast field of usefulness. The otological surgeon existed and filled a field of usefulness before the rhinal surgeon was born. It is not a question of the younger, but more thriving member devouring as it were the one which it claims to have so sorely afflicted, but rather a question of the more thorough amalgamation of the two branches; a more thorough appreciation of the dependence of aural affections upon naso-pharyngeal disease; a more thorough application of rhinal therapeutic methods in the treatment of aural affections by the aural surgeon, the aurist becoming more of a rhinologist and the rhinologist more of an aurist; a more thorough inculcation of these views in the aural and rhinal clinics of this country and elsewhere. Contrary to expressed views, one does not find either in aural clinics that careful examination and treatment of the naso-pharyngeal cavity as is carried out in rhinal clinics, nor in rhinal clinics that same care and attention to the ears that one finds in aural clinics; and appreciation of the inadequacy of the routine treatment of the case as resorted to by the auro-ophthalmologist.

Independent of the direct relationship and import of naso-pharyngeal surgery as applied for the relief of affections of the middle-ear, it also has an important direct action when applied for the relief of naso-pharyngeal catarrh. Coming before a body of experts in naso-pharyngeal diseases, it would seem almost unnecessary for me to refer to the important rôle that glandular hypertrophy and bursitis play in the production and continuance of naso-pharyngeal discharges. It would seem unnecessary, I say, to call attention to these important facts were they universally acknowledged and duly regarded. Most authorities agree and acknowledge that glandular hypertrophy at vault of pharynx when existing in sufficient quantity to cause more or less interference with nasal respiration should be removed, but there is a want of unanimity when this tissue exists only in small quantity. There may be doubt in the minds of many as regards the advisability of the thorough removal of all glandular tissue at vault, possibly thinking that its existence there implies that it must perform some physiological function. In the normal condition, as shown by numerous examinations upon the living and dead, there exist no such excess of glandular tissue. I have been able in a number of cases to demonstrate the important rôle, slight glandular hypertrophy, and projecting knobs of adenoid tissue, play in the production and in the continuation of naso-pharyngeal catarrh. There exists also another condition at the vault in which there is, what might be called, an hypertrophical condition of the mucous membrane. The mucous surface, as noted at the choanæ, appears to be thrown into folds, and projects slightly beyond what appears to be normal; it is deeply injected, being well demarkated from the contiguous mucous surface. In other words, having very much the appearance of granulation tissue as seen in the oral portion of pharynx. The lateral chains of lymphatic tissue occasioned add an element. Bursitis may or may not be acknowledged. There exists a condition at vault that bears all semblance to this condition, and the influence it has in the production of excessive post-nasal secretion cannot be overlooked or

underestimated. While insisting upon the important bearing the conditions just mentioned have in the production of excessive post-nasal secretions and their removal by surgical procedure, in the cessation of the same, I do not wish it to be understood that I offer them as the sole factors, or for an instant overlook other important elements in the production of this affection. What I wish to emphasize is the frequent dependence of post-nasal secretion upon local pathological changes such as those just mentioned, the removal of which will be attended with beneficial results. I do not insist upon any special surgical procedure; the forceps may be used with advantage in one case, the cautery in another.

In closing I must thank you for your kind attention, and apologize for the rambling nature of my remarks and want of strict adherence to the text as given.

ON THE DETERMINATION OF ASTIGMATISM WITH THE OPHTHALMOMETER (JAVAL-SCHIOTZ).

Read in the Section of Ophthalmology, at the Forty-first Annual Meeting of the American Medical Association, Nashville, Tenn., May, 1890.

BY CARL KOLLER, M.D.,
OF NEW YORK.

It is almost a century since the great English philospher, Thomas Young, discovered in his own eye an error of refraction due to different refraction of different meridians. For half a century the knowledge thus obtained did not influence the practice of prescribing glasses. It was almost exclusively astronomers, scientists and physiologists, like Young, Airy, Stokes, Fick and others who studied this asymetry of refraction in their own eyes, measured it and tried to correct it. The first to have used cylindric glasses to this end was Airy. A new impetus was given to the study of this imperfection of the human eye by the invention of Helmholtz's ophthalmometer. With the aid of this perfect instrument, invented to determine the curvature of different surfaces, Helmholtz, Donders and their pupils, as Knapp, Woinow, Middelburgh, Mauthner, etc., studied in all directions the dioptric system of the eye. Fundamental points were settled, as for instance that the refraction had nothing to do with the curvature of the cornea; that the curvature of the cornea is not changed by accommodation; that astigmatism is almost exclusively due to the form of the outer surface of the cornea, that all eyes, with a very few exceptions, have a certain degree of astigmatism; that the meridian of stronger refraction in the great majority of cases is the vertical one, and a great number of minor points. However, the ophthalmometer remained an instrument fit only to be used in a few laboratories by the hands of a few investigators. Practice had to content itself with circumstantial and little exact devices of subjective tests, the great number of which is the best proof of how very unsatisfactory they are.

To the energy and perseverance of Javal, who made the study of astigmatism a task of his life, and who by this has established a claim upon the gratitude of mankind, we are indebted for an instrument, at the same time accurate and so perfectly fit for practical purposes, that it hardly allows any improvement. One cannot say that the instrument, for the time it has been made known to the profession—about ten years—is so generally known as it deserves. When it first came into my hands, about five years ago, I was assistant then at the eye hospital in Utrecht, under the management of Donders and Snellen. A very few exemplars were to be found at the European clinics, and when by the daily use of it I became convinced that it was superior to any other method of finding and determining astigmatism, it was my wonder why the profession did not avail itself of this superior means. When two years ago I came to this country, which is so very ready to adopt new and good methods, I found the ophthalmometer comparatively unknown. Only a few men had it in constant use, and contributed to its becoming known. These circumstances might excuse me when I bring before you an instrument which ten years ago was already perfect in its chief traits, although the new model represents some improvements on the old one. If I succeed in showing you the great advantages this way of determining astigmatism has over all the others, and so contribute to the spread of a valuable invention, I shall feel satisfied with the trouble I have taken.

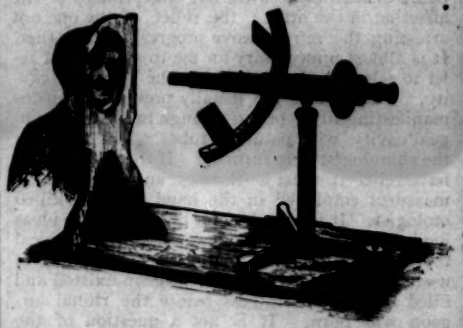


Figure repaesents the old model of the instrument. In the new model a large disc containing the radiating lines and figures for designation of axis covers so much of the instrument as to render the drawing unintelligible.

The opthalmometer of Javal-Schiötz has the object to determine the curvature of the cornea, and the instrument is arranged in such a way that the differences of curvature in the different

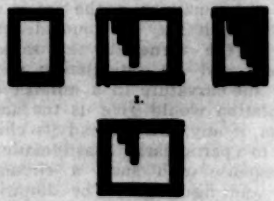
meridians of the cornea accurately and quickly can be detected. It is generally admitted nowadays that astigmatism, in the vast majority of cases, depends chiefly or wholly upon the asymetry in curvature of the cornea. I shall deal later with this question, and for the present will assume the correctness of the statement.

The curvature of surfaces is most easily determined by the measurement of katoptic images; therefore, the instrument has to consist of an image-issuing object and an image-measuring part. Since the curvature shall be determined in different meridians, and in fact differences of curvature shall be measured, both parts must be revolving around a fixed axis. The image-measuring part is represented by a telescope, to which an arc immovable is fastened; the ray of this arc is 300 mm. and the center of its curvature is the eye to be observed. Two targets, one of each attached to one arm of the arc represent the image-issuing object. The size of an image reflected by a convex mirror—and the cornea acts here as a mirror—depends on three things: The size of the object, its distance from the mirror, and the radius of curvature of the mirror. Three of these things known you can calculate the fourth very readily. To determine the radius of the cornea you can put an object of a known size in a certain distance, measure the size of the image reflected and calculate the radius. But you can also follow another way: You can vary the size of an object standing at a definite distance until the mirror of unknown curvature reflects an image of definite size. If you now measure what the size of the object was required for that, you can easily calculate the ray of curvature. This way was adopted by Javal and Schiötz with their instrument.

The two targets attached to the arc are movable and so represent the out ends of an object to be varied in size by moving from or towards each other. In order that this supposed object might keep within the definite distance of 300 mm. from the cornea, the telescope with which the image is observed has an invariable focal distance, so chosen that when the images are seen through it the arc with targets is in a distance of 300 mm. from the cornea. Still the image is to have a certain size. This is attained by a double refrigent prism of Iceland spar placed in the telescope. The prism is cut in such a way that on its place within the telescope it has a doubling power of 3 mm. To explain this latter: If you look at one point through the telescope and the prism hidden in it you will see double images of this point—just distant 3 mm. from each other; and if you look at an object of 3 mm. size you will see double images of this object, one end of one image touching the other end of the other image. That gives you a means at hand to measure the size of smaller objects, in our case of the katoptric image reflected from the cornea. When the image has just the size of 3 mm., the double images which the telescope gives you will touch each other with their outer ends; when the image is larger the ends will overlap each other, and when it is smaller than 3 mm. the ends of the double images will be as distant from one another as the image is smaller. All we have to do to measure the curvature of the cornea is: to place the eye in question on the right place in resting the chin of the person on the head piece, then to direct the telescope upon it by means of a screw and lateral motion and so look at the reflected images of the two targets. As already mentioned the two targets represent the out ends of an imaginary object which can be varied in size by moving the targets. The doubling action of the prism shows us four images of the two targets, two of each one; we observe only the two medium ones representing different ends of the same object and neglect the two outer ones. If the two middle images are just in contact, we know that the image of the imaginary object reflected by the cornea has the accurate size of 3 mm. In case they are distant or overlapping we have to adjust the targets in order to attain the required position. In measuring our object and making a simple calculation we will find the radius of the cornea. But this trouble can be spared, as a division of the arc gives us directly the corneal radius for the corresponding size of object. If the images by adjusting the targets are brought to contact, and remain so, as the arc is revolved about the axis, it may be concluded that the curvature of the cornea is the same in all its meridians and no astigmatism is present. Measuring the curvature in a number of meridians calculation would give us the amount of astigmatism, if any, present, and its chief axis. But owing to a particularity of astigmatic surfaces we can dispense with such a circumstantial measuring and figuring. The dioptrical and katoptrical images of cylindrical lenses and mirrors are displaced in a certain way, and the same holds good for all astigmatic surfaces that can be considered as a sphero-cylindrical combination. The image of a straight line is parallel to the object line only in the case that the direction of the line is coincident with one of the chief axis;—in every other case it is turned to a certain angle.

In my treatise about cylindrical lenses, "Graefes Arch.," 1887, I have given the theory of this fact in order to explain some very interesting phenomena based upon it. This very particularity of astigmatic surfaces enables us to find the axis of astigmatism by one turning of our instrument. Our image-issuing object extends chiefly in one direction, it is parallel with the arc and coincident with the doubling plain of the crystal within the telescope. Suppose the arc with its targets stands by chance just in the

meridian of strongest or weakest refraction; the katoptric images will be situated in the same plane where also the doubling action of the prism takes place. Therefore, the double images will stand in the same level, and we know we have found the meridian of one of the chief axis of astigmatism. But now suppose the arc does not stand in the meridian of one of the chief axis, the reflected image will not be parallel to its subject but turned in a certain degree. The doubling action of the crystal nevertheless takes place in the plane of the arc, and as a consequence thereof the double images will not stand in the same level. By a simple turning of the arc we can bring them to the same level and so find the chief axis. A large disk with radiating lines and figures for the meridians is fastened to the telescope. On its reflected image in the cornea we can read the position of the axis so found. In turning the arc and telescope by 90° we bring the instrument in the other chief axis in order to find the exact amount of astigmatism. It might be said in parenthesis that in this way we ascertain that there are cases of astigmatic curvature of the cornea—although they are very rare, which do not directly follow mathematical rules, as the chief meridians are not rectangular to each other but include smaller angles (until 70°)—contrary to the rule known as Sturm's law, which says that in three-axis ellipsoids the meridians at maximal and minimal curvature include an angle of 90°.



1. 2.

Double images of targets. 1, in contact. 2, overlapping.

The diagram of the targets is so chosen that from the amount of overlapping of images the amount of astigmatism in dioptrics can be read without any further calculation;—for a certain increase in the size of the images corresponds to a certain increase in the size of the radius, that is, a certain amount of astigmatism. Strictly does this hold good only with eyes of one size, and eyes can be of very different size, notwithstanding they have the same refraction. Think, for instance, of a mouse's and an elephant's eye, both emetropic—an example which Javal himself at another occasion has used. For small eyes the part of the image corresponding to one dioptry ought to be smaller, for big eyes larger. But since we have to deal almost exclusively with eyes of the corneal radius 7.8 or 8 mm. the arrangement as it is, is accurate enough and very expedient for practical purposes. Having found amount and direction of astigmatism, we have to verify this result by the glass test. The test with glasses is necessary and cannot be superseded by any other test, just as the determination with the ophthalmoscope can facilitate and abbreviate the glass test but cannot do away with it. The gain is enormous anyhow.

Beginning the examination of a patient as to his refraction there are a number of things which we do not know. We do not know if there is astigmatism; in case there is what its amount is, how the axis stand and which the refraction is. This concurrence of unknown makes the examination of refraction so difficult and often so tedious. The ophthalmoscope, with which every examintion should begin, gives us a number of points, but still there remains sufficient uncertainty to make us feel often that we are at the mercy of the patient's intelligence. With the ophthalmometer of Javal-Schiötz we can settle some of those questions before we enter in the subjective test. We can find out if there is astigmatism or not; we can find its chief axis with exactness; we can find its amount with sufficient accuracy. And all that we do with a rapidity that is not approached by any other method. I have still to speak of the question already mentioned in beginning, if the assumption is just that astigmatism is solely or chiefly due to the cornea, and, therefore, measuring the astigmatism of the cornea will give us the astigmatism of the whole eye. In the first papers about astigmatism there was much spoken about the astigmatism of the lens and its relation to the whole astigmatism. Careful study through a number of years, examination of several thousand eyes with the aid of Javal's opthalmometer, comparative researches with Helmholtz's ophthalmometer have resulted for me the following belief, which is also the opinion of most of the men who have directed their attention to this point:

1. Static astigmatism of the lens, that is astigmatism produced by the lens in its condition of rest is a comparatively very rare thing; very likely oblique position of the lens relative to the axis of vision is the cause. It is a remarkable occurrence that this condition was present in the eye of Thomas Young, the discoverer of the so-called regular astigmatism.

2. In the eyes of young people up to 35 years of age there is dynamic astigmatism of the lens present; that is astigmatism based upon involuntary irregular contractions of the ciliary muscle. This dynamic astigmatism of the lens is opposite to the astigmatism of the cornea so as to lessen its amount in a certain various degree. It does not change the axis of astigmatism, so that the axis of astigmatism of the whole eye is invariably coincident with that found in the cor-

nea. For older people with little or no accommodation, also in such young ones who have used correcting cylindric glasses for a certain time, we find very little or no difference between astigmatism of the whole eye and astigmatism of the cornea; in these eyes the asymetric spasm of the ciliary muscle has subsided. Similar to the spasm of accommodation in hypermetropes subsiding either by age or by constant use of correcting glasses.

3. I have found only a few single cases amongst a great number of eyes where the axis of the total astigmatism were not coincident with the axis of corneal astigmatism. This is due very likely either to oblique position of the lens or irregular swelling of the lens in beginning cataract.

I have to add a few words about the comparative merits of three objective tests for estimating astigmatism—retinoscopy, ophthalmoscope, ophthalmometer—letting aside all the subjective ones, which if not supported and preceded by one of the objective tests take up much of your time and do not give you the feeling of surety absolutely necessary in dioptric work.

Retinoscopy might be said to be the only really accurate objective method to estimate total astigmatism of the eye together with the refraction. However, it takes much time, and for detection of low degrees of optic errors considerable practice is necessary. The chief objection to me is the circumstantial proceeding of the test and the necessity of dilating the pupils with atropia or homatropia if an accurate result shall be obtained.

As to the ophthalmoscope it has its enthusiasts, who believe themselves able to determine astigmatism with the aid of this instrument. I admit that we can detect astigmatism with the ophthalmoscope, tell if the vertical or the horizontal meridian is the stronger refracting, and how much about the amount of the astigmatism might be. We cannot find the chief axis accurately; in some cases we cannot find the amount of astigmatism with sufficient accuracy. That refers to every observer, however skilful he might be in the use of the ophthalmoscope—and that because it does not depend on the skill but on the chance of circumstances. If vessels happen to run in the chief axis, one can determine the astigmatism. If they do not happen to run there, accurate determination of astigmatism with this method is not feasible.

The ophthalmometer does not require any dilatation of pupils and is not dependent on the chance of circumstances. In less than one minute you can tell with perfect accuracy if there is astigmatism in an eye, you know exactly within 5° how the axis is situated, you know very approximately the amount of astigmatism. You have nothing to do than to place the cylindric glass—it does not matter if positive or negative—in front of the patient's eye, and having so corrected the astigmatism you will find it easy to find the refraction.

Javal's ophthalmometer furnishes the greatest accuracy in combination with greatest rapidity of work, and, therefore, it is the instrument of the future.

ANTIRABIC INOCULATIONS.

SENSATIONS EXPERIENCED BY INOCULATED PERSONS. HOW IMMUNITY IS ATTAINED.

Read by Title in the Section of Practice of Medicine, Materia Medica and Physiology, at the Forty-first Annual Meeting of the American Medical Association, at Nashville, Tenn., May, 1890.

BY PAUL GIBIER, M.D.,

DIRECTOR OF THE PASTEUR INSTITUTE OF NEW YORK.

More than ten thousand people have been inoculated during the five years in which the Pasteurian inoculations have been practiced. Among the number were a few doctors; nevertheless, there does not, as far as my knowledge goes, exist any detailed narrative of the phenomena noticed in those who have submitted to the preventive treatment for rabies after having been bitten. I have therefore thought that it would prove interesting for the study of immunity in general, and as a contribution to the history of this system of treatment in particular, to make known some of my observations.

Following in the steps of several doctors, either directors or assistants in antirabic institutions, who did so to guard against a possible accidental inoculation during their daily manipulations of virulent matter, I inoculated myself as well as two of my assistants, Messrs. Roger and De Monchy. A young lad attached to the laboratory was likewise inoculated. But I must here and at once make the following remark, that whereas the lad complained only of local sensibility, of fatigue, and of a little nocturnal agitation, we, who are more accustomed to observations, made several which I think are worthy of record.

The series of inoculations which I practiced on myself and on my two aids, began March 27, 1890, with marrow of the fourteenth day, and ended on the 10th of April following, with matter of the second day.

The subcutaneous injections of the first four days were followed by a slight irritation, which, in one of us, extended so far as to redness of the tegumentum *in loco*, but without induration. During the night, sleep was somewhat disturbed by the sensitiveness of the lateral part of the lumbar regions, viz.: at the spot of the inoculations. During the first ten days, the symptoms were about the same. The temperature of the body rose slightly, but it cannot be said whether this slight febrile motion was caused through and by the injected matter, or whether it was the result of the

slight inflammation caused by the injection itself. These symptoms were considerably modified by hot baths of lengthy duration. Towards the tenth day, the tissues seem to have accustomed themselves to the injected liquid; the reaction was less acute, the pain decreased, and three days after the last injection there remained, so to speak, hardly any local traces of the fifteen injections made on each side.

Thus far, I have not said anything to explain the working of the immunity, but I will now take up the subject. How, then, is immunity obtained?

In a book I published last year ("Analyse des Choses," Dentu, éditeur, Paris) I propounded a theory which, according to my belief, may be of use to explain the hitherto mysterious property, common alike to man and to animals, of resisting the inroads of certain diseases when once attacked by them. In the living body, what is there that resists the development of the infectious figurated elements which have reached the body from the outside? Evidently it is the figurated elements which make up that body—in other terms, it is the living cell. For me, immunity is a phenomenon of cellular memory. The cellulæ are small individual beings, endowed proportionately with the constituting principles of the living being, such as we know it. As such, they enjoy the faculty of memory, and each time that they are attacked by a malady, they remember—automatically, if you like—but still they remember how they have gotten rid of the intruder (I mean the microbe) which attacked them, and when next assailed, they know immediately what measures are necessary to prevent the enemy from retaining a hold on them.

I do not desire to dwell any further on this theory. It is sufficient for my purpose to have indicated it; I will only remark that the recent works of Metchnikoff on the part played by the white globules in the case of inflammation produced by bacteria, certainly go to strengthen that theory. I will now try to show, by means of the three cases that I am about to analyze, that rabies, which is a malady affecting principally the nervous centres, is no exception to this rule.

In order that the nervous centres be protected against a mortal attack of rabies, it is necessary that, in order to forestall the progress of the microbe, other microbes of the same species, but attenuated, should be placed in contact with the cells of the spinal cord and of the brain. Let me make the passing remark, that the first subcutaneous injections are made with matter the prolonged dessication of which has caused its virulence to disappear, but it is not unreasonable to admit that the nervous cell must be influenced, in a measure, by the ptomaines secreted by the hydrophobic microbe, and that this reasonably gives it a certain degree of power to resist (through being accustomed to its secretions) the attack of microbes at first weak, then more and more virulent, when introduced by the successive inoculations. When, after having followed (as shown by experience) the nervous fibres which from the bitten spot go to the cord and to the brain, the infectious germ reaches the nervous cells of the cerebro-spinal axis, it finds them prepared, hardened against its attack, and it can do them no injury. Such is immunity.

What goes to demonstrate that during antirabic inoculation things take place as I have just described, is that my two assistants and myself experienced, during and after the inoculations, a series of phenomena indicating that certain departments of the nervous system were stimulated into activity by some unusual excitement. For my part, during the days when I took the last inoculation, and a few days after, I observed a greater activity of the salivary glands; several times a day I felt saliva welling from the submaxillary glands, and from the parotid canal, my mouth filled with saliva and I was obliged to eject it. During the night I was obliged to urinate, which is not my usual custom. These symptoms were the same in the case of my assistants, which evidently shows a sign of excitation of the medulla oblongata. I recall that in 1884, in a pamphlet on hydrophobia ("Recherches sur la rage et sur son traitement," Allatin and Houzeau, publishers, Paris), I have shown that *polyuria* was a frequent symptom of rabbits inoculated with the virus of hydrophobia, at the moment their nervous system was invaded by the germs. During the last week of the treatment, and the week following, I felt a certain heaviness of the head and an inability to work. These symptoms were equally experienced by MM. Roger and De Monchy, with these additional ones: On the fifth day (inoculated with the marrow of the sixth day), M. Roger complained of a sudden pain in the right side, lasting about half an hour. On the eighth day (inoculated with the matter of the fourth day), he experienced dizziness, which lasted intermittently for fifteen days. The twelfth day, he felt pain in the lumbar region, extending as far as the right testicle. On the fourteenth day the vertigo continued, accompanied by buzzing in the ears, which rendered walking difficult. But since this treatment, M. Roger assures me that he has been relieved of a chronic dyspepsia accompanied by pyrosis. The alvine functions are also more regular. M. De Monchy was more affected by nervous troubles. From the second injection, he felt pain in the nape of the neck; on the fifth day these pains spread into the brachial plexuses. After the ninth inoculation, some fulgurating pains were experienced in the region of the left crural nerve. On the twelfth day, he suffered a frontal cephalalgia and an exacerbation of the pains at the nape of the neck. These symptoms continued for about fifteen days after the

treatment, accompanied by unusual sexual excitement, sadness, undefined preoccupation, and unlocalized pains. The appetite was always good. Finally, MM. Roger and De Monchy were affected, on or about the fifteenth day following the last inoculations, by pains in the spots where the injections were made. These pains were so acute as to suddenly awaken them in the middle of the night. I call attention to this last fact, because in one case, where a person inoculated died of hydrophobia, in spite of the treatment, the adversaries of the Pasteur method took advantage of this fact—that the patient had complained of suffering at the spot of the inoculation—to pretend that hydrophobia had been communicated to him by these inoculations. One sees, however, that these injections are able to cause acute pain some time after they have been made, without determining hydrophobia.

To-day, May 19, nearly a month and a half after the last inoculation, we are, all three, in a state of health as satisfactory as possible. I will add that the sixteen persons who have been inoculated at the New York Pasteur Institute in the two months following its opening, are enjoying good health, whilst several domestic animals bitten by the same dogs that attacked several of these patients, have died of hydrophobia. A man bitten by one of these dogs, and not treated at the Institute, has also died of hydrophobia.

I am happy to make known these facts, and I shall be still happier if, by the application of the method of my illustrious teacher, M. Pasteur—the method which is so successful in Europe—I am able on this side of the Atlantic to preserve the greatest number of persons possible from the frightful death which is the consequence of hydrophobia.

A PECULIAR CASE OF ADDISON'S DISEASE.

Read in the Section of Dermatology and Syphiligrophy at the Forty-first Annual Meeting of the American Medical Association, Nashville, Tenn., May, 1890.

BY A. H. OHMANN-DUMESNIL,

PROFESSOR OF DERMATOLOGY IN THE ST. LOUIS COLLEGE OF PHYSICIANS AND SURGEONS.

Despite the fact that the literature of Addison's disease is vast and that much has been written upon this peculiar affection, its clinical characteristics and its pathology, each new case which is reported has a certain interest attaching to it which is certain to attract more or less attention. I do not purpose writing an exhaustive paper upon the subject, but merely wish to place upon record a case which proved interesting to me from the fact that a certain symptom presented itself which I have not found recorded in connection with this affection. I wish to state, however, that my search has been by no means exhaustive, and that similar cases might have escaped me in my rather rapid review of a portion of the literature of the subject. This symptom to which I will call attention later on in a more explicit manner is one which I deem of some importance, as it confirms the view that Addison's disease is primarily and essentially an affection of the sympathetic nervous system. If we can positively determine this to be a fact there may be found some means of arresting the disease even if the pigmentation can not be caused to disappear. As the trouble is one which almost invariably terminates fatally, such an advance in the curative management would be a triumph in therapeutics.

That not more is known of Addison's disease is probably due to the fact that it is an affection not often observed. I have had an opportunity of observing but two cases, in one of which the history was such as we ordinarily find it, whereas in the other a few points existed which added interest and which have led me to present a short history and clinical record which is as follows:

Case 1.—On February 6 of this year I was requested by Dr. W. W. Graves, of this city, to see a case of Addison's disease. The patient was a man of forty-six who gave the following history: While employed in a grain elevator in Memphis, Tenn., he became aware of a general feeling of malaise. This "bad feeling" as he expressed it became so great, that as soon as he felt able to do so, he left for St. Louis. The beginning of this attack was about October 15, 1889. The bronzing of the skin was hardly noticed at this time but it progressed steadily. He arrived in St. Louis about December 20, and a week later it was noticed that he perspired very freely over the whole body and that the sweat had a most intense and disgusting odor. So marked was this that the doors and windows had to be opened. The whole house was permeated by this smell, which resembled that of carrion. The bromidrosis gradually disappeared and the amount of sweat diminished. Family history good.

At the time I examined the man I found him well developed—perhaps slightly emaciated, but not perceptibly so. Expression of face dull. He was still feeling rather weak although he had improved somewhat of late. He complained of a pain in the pit of the stomach, but pressure exercised in this region did not elicit any pain. He occasionally "bloated," and the tympanitis would become so great as to distress him much. He would be unable to put on his clothing, and he stated that it came on suddenly. Pressure in the back over the areas of the kidneys and suprarenal capsules did not elicit any pain. The patient was of a nervous disposition and had always been so.

Inspection showed that the man had a good supply of hair of a dark-brown color—almost black. He stated, however, and was corrobor-

ated in this by his sister, that before his present illness his hair was of a light color—that he was a blonde. The skin of this individual was apparently of normal thickness, no more than the usual moisture being perceptible. In fact it appeared perfectly normal with the exception of one thing—the color. The whites of the eyes and the mucous membrane of the mouth were devoid of any adventitious pigmentation.

The entire integument with the exception of that covering the head and the hands was of a marked brownish-bronze tint. The chest seemed to be of a somewhat slightly darker hue than the back. Disseminated throughout the affected area darker macules of various sizes could be observed. The areolæ about the nipples, the axillæ, perineum and internatal field was also darker than the general surface. On the other hand, that portion of skin lying over the scapulæ was lighter in color. A few small scars existed upon the chest and these were whitish. On the chest and back there existed numerous white macules of the size and shape of small oats. These were numerous, more particularly upon the chest and upon the forearms. The patient stated that these were small scars from wounds made by the grain which scratched him while at work in the bins of the elevator. While this appeared to be a very plausible explanation to account for the presence of these spots, close inspection failed to furnish any satisfactory evidence of their being scars; and, as excision of a portion of the integument was not permitted a resort to microscopical examination could not be made in order to obtain confirmatory evidence.

That Addison's disease is due to some disturbance of the sympathetic nervous system there seems to be no reason to doubt. The subjective symptoms which are noted are of a nature to point to such a cause, and the bronzing of the skin is another sequence dependent upon the same origin. It is pretty well established at the present day that many affections, characterized by an increase in the amount of pigment of the skin, are due to disturbed sympathetic innervation. Crocker states that the study of Addison's disease has made it highly probable that, whenever the abdominal sympathetic, especially the solar plexus, is irritated general pigmentation is likely to ensue. Greenhow and McCall Anderson do not look upon the symptoms as dependent upon destruction of the supra-renal capsules but upon the extension of the morbid process to the neighboring parts, especially to the solar plexus and semi-lunar ganglia. The general consensus of authorities of to-day is that there exists involvement of the sympathetic nervous system.

That this process is a severe one the general prostration and rapidly fatal termination of a certain number of cases show very plainly. But, in addition to this, we have anatomical proof furnished in the profound alterations observed in the suprarenal capsules, in the greater number of cases in which necropsy has been performed. Addison was not far from the truth when he stated that the disease was due to these alterations in the capsules—he builded better than he knew. The remarkable investigations and demonstrations of modern investigators have conclusively shown that the suprarenal capsules are ganglia of the sympathetic nervous system directly connected with the solar plexus and semi-lunar ganglia. When we take into consideration the degenerative changes observed in the capsules, in some cases, there can be no room left to doubt that the involvement is a very serious one. This discovery also easily accounts for the fact that, at some post-mortem examinations, the capsules were found to have suffered no change, a circumstance which would seem to indicate that the process begins most probably in the ganglia situated higher up.

To make a short digression. It is admitted on the part of all authors that functional disturbances of the glands of the skin are also dependent upon disturbed sympathetic innervation. That sympathetic nerves preside over glandular functions is admitted and the glands of the skin are subject to the general law. This is especially true of those disturbances of function characterized by an increased amount of secretion. Prominent among functional cutaneous disorders is hyperidrosis, of which bromidrosis is merely a variety in the majority of cases. Whether the odor be due to the bacterium fœtidus, to chemical decomposition, or to direct nervous influence as maintained by E. Monin, we need not consider here. The main point to bear in mind is the increased amount of sweat. This, when universal, denotes a more profound implication of the nervous system than when localized in some particular area.

In the case which I have outlined above there existed for some little time a general bromidrosis, indicating a rather serious involvement of the sympathetic nervous system. The intensity of the odor also tended to show that the process was a severe one. The sudden onset and as sudden disappearance would further go to support the claim of its nervous origin. The presence of microörganisms or of chemical decomposition could hardly be claimed although either one would not militate against the assumption of a neurotic origin for the hyperidrosis.

The fact of the presence of this symptom is interesting on account of its rarity in connection with Addison's disease and because, as stated above, it shows the profound involvement of the sympathetic nervous system which must have existed in the case. We find then that the skin is pigmented and that the functions of a set

of glands are also changed. In other words, two manifestations of an entirely dissimilar character and which we are accustomed to study separately are here found to be coincident and, beyond any doubt, dependent upon a common origin.

The lack of time and opportunity have prevented my making a study of this question. There is no doubt, whatever, in my mind that other causes of a like nature have occurred, but the importance of the graver malady as well as its comparative rarity completely overshadowed the importance of the symptom which probably is one of frequent occurrence—the bromidrosis.

A feature which was observed and which might partially account for the fœtid sweat is the fact noted in the history that there was no pigmentation of the mucous membrane of the mouth. The explanation that this would furnish would be that the energy usually directed to the mucous membrane had been diverted to other channels, or, in other words, the perverted innervation was transferred from the mucous membrane to its external congener, the skin. This process is not an unusual one. We observe it, for instance, in erythema nodosum in which the eruption rapidly disappears to give way to a bronchitis, and this in turn leaves to be followed by a recurrence of the eruption.

In this short clinical contribution I have merely desired to sketch an interesting condition, and, so far as I know, a peculiar case. While the literature of Addison's disease is plentiful there is really but little that is tangible. In the light of modern anatomical investigations, however, we can see the promise of great improvement in the future therapeutical measures to be employed, as well as in the more thorough and intelligent pathological investigations which will be made.

5 South Broadway.

NOTES ON A CASE OF TETANY.

Read in the Section of Diseases of Children at the Forty-first Annual Meeting of the American Medical Association, at Nashville, Tenn., May, 1890.

BY JACOB SCHNECK, M.D.,
OF MT. CARMEL, ILL.

Under the various names of tetany, tetanella, idiopathic muscular spasm, and carpo-pedal spasm, we find described a variety of cases which have, as prominent symptoms, more or less tonic contractions of the muscles of various parts of the body, beginning usually at the extremities and passing, in somewhat regular succession, to the muscles of the body and head. The consciousness of the individual is not disturbed during the paroxysm.

The symptoms of this disease trench closely on those of a number of the functional neuroses; and it is probable that many of the cases reported under this heading are really spasms due to reflex irritation, caused by teething or a disordered condition of the alimentary canal; or to irritation produced in the nerve-centres by the distal ends of nerves, leading to them, being involved in cicatrices or other inflammatory products; these cases are permanently cured by removing the cause of the irritation. It is also probable that in this category cases have been reported which should be described under the title of hysteria.

The causes usually assigned as producing tetany are exceedingly numerous and various; chronic and debilitating diarrhœa, lactation and pregnancy, stand first, perhaps. Typhoid fever, rheumatism, measles, pneumonia, Bright's disease, small-pox, cholera, malaria, exposure to cold, anæmia, sexual excesses, alcoholism, excision of thyroid gland, intestinal worms, disordered stomach from undigested food, lead poisoning, and epidemic influences, have all been thought to be causes. In reading over the reports of some cases one is led to believe that many of the above named causes are only coincidences, and had nothing to do with inducing the disease. An important diagnostic point of this disease is the tendon-reflex action produced by pressing on the large vessels and nerves (Trousseau's symptoms). This is not always present, but in no other disease has it ever been recorded.

Chvostek was the first to direct attention to the increased mechanical excitability of the muscles and nerves in this disease; he found in many cases that during the latent period the calf-muscles were slightly contracted. During the paroxysms consciousness is intact; and the muscular spasms are tonic.

The present light on the pathology of this disease points to the nerve-centres as the site of disturbance.

Herz thought the disease was due to anæmia of the spinal cord. A. Jacobi attributes it to meningeal hyperæmia. Gowers teaches that it is probable that the primary pathological lesion is in the motor cells of the cerebral and spinal structures; and that thus is explained the tendon-reflex symptoms usually present in this disease. Whatever the pathology may be, there appears to be an inability to inhibit in the nervous and muscular organs.

I am induced to offer these notes on the following case for three principal reasons:

1. Tetany is a disease whose limits and symptomatology are not well defined.

2. The case which fell into my hands had the signs, usually given as belonging to this disease, well-marked. In addition there were other prominent symptoms, which I do not find given in any of the accounts of the disease which I have consulted, viz.: the absence of normal reflex excitability in the extensor muscles, as shown by the want of the tendon reflex action of the exten-

sors of both the upper and lower extremities. And also the Argyll-Robertson pupil; both of which signs improved and became normal *pari passu* with the diminution of the number and severity of the attacks.

3. For the purpose of putting on record the treatment and its result, so that the profession may give it a further trial.

Case.—Oct. 23, 1889, Clara I. Brine, of Grayville, Ill., was brought to my office; she being a well developed, bright and healthy looking girl of ten years. The mother and father, who accompanied her, were both above the average in size, of intelligent bearing, and barring a few slight attacks of unimportant sickness, had always been healthy. Their five other children were all well developed. Clara had been healthy until three years since, when she suffered from some ailment of the bladder, but which was of temporary duration. Near two years ago, while in her usual health, she was suddenly seized with a swimming sensation and fell backwards on the floor; not, however, losing consciousness. Attacks of this character occurred at frequent intervals for nearly one year. She usually avoided falling by holding to some object until the sensation passed off. The physician who treated her told the parents the attacks were caused by some heart disease. Gradually these paroxysms were ushered in, or preceded, by more or less tonic cramps of the lower limbs; felt most severely at the knees; when the feet were involved, the toes would be drawn together and towards the sole of the foot. Later the upper extremities, and finally the jaws, became involved in the tonic contractions; but as they did so, the dizziness became less and the cramps of the lower limbs grew lighter, and for the last six months had ceased entirely; while those of the upper extremities, neck, and jaws, had grown correspondingly more severe and more frequent; averaging about ten a day; being most frequent during the forenoon, but never occurring during sleep. In some of the most severe attacks there was decided opisthotonos. In all those attacks consciousness was never lost. During the past year she had been treated by a physician for epilepsy. During the time of her visit to my office, while I was familiarizing myself with a history of her case, she was seized with a severe paroxysm, while in the midst of a sentence, and when not in the least excited. It came without any premonition and involved both upper extremities, and the muscles of the neck and jaws, in the order named. The muscles were so rigid that she was unable to speak, swallow, or move the head; the elbow-joints were flexed and the arms held rigidly from the side; the right hand was closed into a hard fist; the fingers of the left were first irregularly over-extended, then drawn together, the two outer coming under the two inner ones, while the thumb was drawn down to the palm, forming the obstetric hand. The face became full and flushed. This condition lasted near two minutes.

The paroxysm was accompanied by radiating pains in the parts involved. "A sharp pain, with other pains shooting out from it," was her expression. She complained, after the attack, of numbness and formication in the muscles affected, also of ringing in the ears. Examination revealed slight œdema of the hands and face; tendon-reflex of knees and wrist entirely absent; Argyll-Robertson pupil well marked; pulse 120 per minute, small and hard. Had always suffered slightly from constipation; appetite good; sleeps well and quietly; temperature normal. There was no tenderness along the spine or over the ovaries, or any other part of the body; not subject to excessive perspiration; nervo-muscular irritability could not be produced by raking finger-nail in front of ear; there was no nausea or vomiting after attacks; she had not been a bottle-fed infant; had never suffered from rickets or laryngismus; did not pass large quantities of urine after paroxysms; pressure on the large blood-vessels or nerves did not bring on an attack; applying cold water to hands failed to cut short a paroxysm.

The treatment and progress of the case were as follows:

October 23, 1889.

℞. Liquor potass. arsenitis, ʒ j
Sodæ brom., ʒ ss.
Aqua, ad. ʒ iv. M.
Sig.—One teaspoonful after meals.

℞. Antifebrin, gr. xxx.
Divide into 15 capsules.
Sig.—One capsule before meals.

October 31, symptoms very slightly improved; averaged five paroxysms per day since the former visit; pulse 120; tendon-reflex of the extremities imperceptable. Argyll-Robertson pupil still marked.

Thinking she might be afflicted with worms, I gave the following:

℞. Hydrarg. chlor. mitis, gr. ij.
Sodæ bicarb. santonine, ää gr. vj.
Mix fiat chart No. vj.
Sig.—One powder at 4, 6 and 8 P.M. on consecutive nights.

Then to begin the following:

℞. Fl. ext. conium, ʒ j.
Sig.—Eight drops after each meal.
℞. Glonoin, ʒ iv.
Sig.—Two drops two hours after meals.

Nov. 12.—Had passed no worms from santonine. During the first six days she had nineteen paroxysms, and none during the last five. Continues the two last prescriptions.

Dec. 4.—Had no paroxysm since last visit; tendon reflex of both upper and lower extremities nearly normal; pupil responds properly to light. Continued the nitro-glycerine and stopped the conium.

Feb. 3, 1890.—Had no attack since last report; continued treatment.

May 10, 1890.—Reports herself as entirely well, and has taken no medicine for two months.

DIAGNOSIS AND OPERATIVE TREATMENT OF GUNSHOT WOUNDS OF THE STOMACH AND INTESTINES.

Read by Invitation in the Surgical Section of the Tenth International Medical Congress, August 8, 1890.

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(*Concluded from p. 363.*)

2. *Treatment of Gunshot Wounds of the Stomach and Intestines.*

The propriety of surgical interference in cases of gunshot wounds of the stomach and intestines will depend on one of two things:

1. Dangerous internal hæmorrhage.
2. Visceral wounds of the stomach or intestines large enough to permit of extravasation and the escape of hydrogen gas on applying the diagnostic test.

Alarming intraperitoneal hæmorrhage furnishes an urgent indication for treatment by laparotomy irrespective of the existence of the visceral lesions of the gastro-intestinal canal. In these days of aggressive surgery it would indeed be unjustifiable to permit a patient to die slowly but surely from hæmorrhage from an intra-abdominal wound which in itself is amenable to successful treatment by prompt surgical means.

The signs and symptoms of profuse internal hæmorrhage come on soon after the injury has been inflicted, and are so plain and significant that they can hardly be misinterpreted even upon a brief and superficial examination. The progressive acute anæmia, the conditions of the pupils and pulse, and the complexus of nervous symptoms which attend alarming internal hæmorrhage present a clinical picture which, when once seen, is never forgotten and always recognized.

In such cases no time should be lost in looking for evidences of the existence of wounds of the gastro-intestinal canal, or in applying the hydrogen gas test, as the prime and most urgent indication is to gain access to the bleeding vessels by opening the abdomen in the median line, and then to arrest the hæmorrhage at once by compression until the bleeding points can be secured by ligation or the antiseptic tamponnade. After the hæmorrhage has been arrested, the whole gastro-intestinal canal, or such part of it as, from the course of the bullet, is known to have been exposed to injury, is tested by insufflation of hydrogen gas for the purpose of ascertaining in as short a time as possible, the existence, location and number of perforations.

In cases in which, on account of the absence of dangerous hæmorrhage, the symptoms are less urgent, it is important to determine the necessity of treatment by laparotomy by resorting to the hydrogen gas test for the purpose of diagnosticating the existence and size of perforations of the gastro-intestinal canal. If through insufflation can be made, it is proof positive that no perforations exist, or, if present, that they are too small for extravasation to occur, and in the absence of other indications for abdominal section it is advisable to pursue a conservative course of treatment. Such patients are given an opiate to diminish the peristaltic action of the bowels; an absolute diet is ordered and rest in bed enforced for at least a week, while infection from without is prevented by subjecting the external wound to rigid antiseptic treatment.

If the hydrogen gas test, either by rectal insufflation or direct inflation of the stomach, yields a positive result, sufficient and reliable information has been gained to warrant laparotomy, as the surgeon has then satisfied himself that he has to deal with an injury which, if not properly treated, is almost certain to result in the death of the patient.

Laparotomy for Gunshot Wounds of the Stomach and Intestines.

I have already insisted that in every perforating gunshot wound of the abdomen, all necessary preparations for laparotomy should be made before the existence of visceral wounds of the stomach or intestines has been demonstrated by the application of the hydrogen gas test, as the latter procedure necessitates the administration of an anæsthetic. The stomach can be inflated without an anæsthetic and the existence or absence of perforations demonstrated before any definite plan of treatment is proposed, but rectal insufflation of hydrogen gas should never be undertaken in the diagnosis of gunshot wounds of the gastro-intestinal canal without complete anæsthesia.

Before I was able to demonstrate the existence of visceral wounds of the stomach and intestines without opening the abdominal cavity, I never succeeded in obtaining the consent of the patient and friends to make a laparotomy in cases of gunshot wounds of the abdomen; but since I have been able to tell the people that the course to be pursued will depend upon the result of the test, I have not met with a single refusal. The hydrogen gas flame at the wound of entrance is an argument more potent than words in convincing laymen of the necessity of active surgical interference. If the public understands that the abdomen will only be opened after the surgeon has satisfied himself and has demonstrated the existence of a mortal injury, the patient and his friends will be only too anxious to avail them-

selves of the benefits to be derived from the only resource which promises any hope of saving life.

Medico-Legal Responsibilities in the Performance of Laparotomy in the Treatment of Perforating Wounds of the Abdomen.

As in private practice the treatment of penetrating wounds of the abdomen always involves great medico-legal responsibilities, it becomes of the greatest importance to arrive at positive and reliable conclusions in reference to the character of the injury before the patient is subjected to the additional risks to life incident to an abdominal section.

We will suppose a case. In a quarrel a man is shot in the abdomen. The assailant is placed under arrest. The surgeon who is called establishes the fact that the bullet has entered the abdominal cavity, and from the point of entrance and its probable direction he has reason to believe that it has wounded some part of the gastro-intestinal canal, and he concludes to verify his diagnosis by an exploratory laparotomy; the operation is performed, the gastro-intestinal canal is examined in its whole length, but after the most careful inspection no visceral wound is found. Over an hour is consumed in the examination, during which time the peritoneal cavity is exposed more or less to infection. The wound is closed and the patient dies of shock in two or three hours, or of septic peritonitis on the third or fourth day. The attorney for the State charges the defendant with murder. During the trial the defense will very naturally raise the questions: "Did the man die from the effects of the injury or the operation?" "Shall the defendant be tried for assault and battery or for murder?" During the trial the attending surgeon is made a target for a volley of a medley of scientific and unscientific questions by the cunning attorney for the defense in the attempt to save his client from the gallows or a sentence of imprisonment in the State Prison for life, at the expense of the reputation of the surgeon and the respect and good name of the profession he represents.

This picture is not overdrawn. Such cases have happened and will happen again. It is entirely different if the surgeon can, by means of the hydrogen gas test, ascertain the existence or absence of fatal complications without subjecting the patient to any additional risks to life. If the test yields a positive result, the indications for an operation are clear, and are understood and appreciated by laymen who may serve on the jury.

If a laparotomy, performed in the treatment of a mortal injury, is followed by a fatal termination, the result must be charged to the person who inflicted the injury and not to the surgeon who failed in his attempt to save his patient from certain death. If the operation proves successful, the surgeon has not only saved a life, but he has been at the same time instrumental in diminishing the severity of the sentence of the one who inflicted the injury.

Preparation of the Patient.

A patient suffering from a perforating wound of the abdomen should be properly prepared before he is subjected to examination by the hydrogen gas test, and, if this yields a positive result, to laparotomy. If the stomach is filled with food, a salt water emetic should be given for the purpose of evacuating the stomach. The rectum and colon should be emptied by a copious enema of lukewarm water to which may be added a tablespoonful of common salt. These precautions greatly facilitate the application of the hydrogen gas test, and guard against possible sources of error in diagnosis; at the same time they leave the gastro-intestinal canal in a better condition for operative treatment and a speedy repair of the sutured wounds. A hypodermatic injection of one-fourth of a grain of morphia and one one-hundredth of a grain of atropia should be given shortly before the anæsthetic is administered, as these drugs in the doses specified assist the action of the anæsthetic, secure rest for the intestines and sustain the action of the heart. If the patient is much prostrated two ounces of whisky diluted with four ounces of warm water should be given *per rectum*. The external wound and the whole abdomen must be thoroughly disinfected.

Operating Room.

The room in which the examination is to be made, and possibly laparotomy performed, should be cleared of all draperies, pictures and unnecessary furniture, and the temperature should not be less than 80° F. It is a good plan to sprinkle the bare floor, walls and ceiling with a strong solution of corrosive sublimate or carbolic acid. An ordinary table covered with blankets and a clean sheet will answer for an operating table. Wash basins, dishes and pitchers are to be sterilized by heat. Plenty of aseptic sponges, clean towels, and hot sterilized water must be provided. A hypodermic syringe and the necessary stimulants must never be absent. A sufficient quantity of hydrogen gas can be generated in from five to fifteen minutes. The articles necessary for applying the hydrogen gas test are a stomach tube and a four gallon rubber balloon in which the gas is stored, which is connected by four or six feet of rubber tubing with the short rectal tube, for which the vaginal tip of an ordinary Davidson's syringe can be used. Wax tapers are useful in lighting the escaping gas.

Incision.

Great diversity of opinion still prevails in regard to where the incision should be made. In the majority of cases the median incision affords

advantages which give it the preference. It should always be selected in cases of gunshot wounds of the stomach, and where the wound of entrance is located near the median line, and where it is known that the bullet has taken an antero-posterior course. A median incision affords most ready access in the treatment of wounds of the small intestine.

The result of the hydrogen gas test will prove of much value in deciding the location of the incision. If, in gunshot wounds of the upper portion of the abdomen, direct inflation of the stomach through an elastic tube reveals the existence of perforation of this organ, the median incision should be selected. If rectal insufflation yields a positive result before the gas has passed the ileo-cæcal valve, the incision should be made over the wounded portion of the colon, which is usually indicated by the course of the bullet. A wound in the transverse colon can be found and dealt with most efficiently through a median incision, while perforation of the cæcum or ascending colon calls for a lateral incision directly over the wounded organ, while a lateral incision on the left side is indicated if from the direction of the bullet it is evident or probable that the colon below the splenic flexure is the seat of the visceral injury. In the treatment of a gunshot wound of the colon through a lateral incision it is absolutely necessary to make the incision sufficiently long so as not only to facilitate the finding and suturing of the perforation, but also to enable the surgeon to search for and treat additional injuries. By suturing the external wound with several rows of buried sutures there is but little danger of a ventral hernia following.

Laparotomy performed for the arrest of dangerous hæmorrhage should always be done by making a long median incision which will afford the most direct access to the different sources of hæmorrhage. Very often it will be advisable to make the incision in the line of the wound of entrance, more especially in cases where a lateral incision is indicated from the location of the wound, from the course of the bullet, and from the results obtained by application of the hydrogen gas test.

Arrest of Hæmorrhage.

In perforating wounds of the abdomen profuse hæmorrhage is more frequently of parenchymatous and venous than of arterial origin. Gunshot wounds of the liver, spleen, kidneys and the mesentery give rise to profuse and often fatal hæmorrhage. After opening of the peritoneal cavity it is often very difficult to find the bleeding points, as the blood accumulates as rapidly as it is sponged out, and it becomes necessary to resort to special means in order to arrest the profuse bleeding sufficiently to find the source of hæmorrhage.

One of two resources should be employed: 1. Digital compression of the aorta. 2. Packing the abdominal cavity with a number of large sponges. Digital compression of the aorta below the diaphragm can be readily made by an assistant introducing his hand through the abdominal incision, which in such a case must be larger than under ordinary circumstances. Compression of the abdominal aorta immediately below the diaphragm will promptly arrest the hæmorrhage from any of the abdominal organs for a sufficient length of time to enable the surgeon to find the source of hæmorrhage and carry out the necessary treatment for its permanent arrest.

Hæmorrhage from a perforated, lacerated kidney may demand a nephrectomy. A similar wound of the liver is cauterized with the actual cautery or tamponned with a long strip of iodoform gauze, one end of which is brought out of the external wound. A wound of the spleen, if the hæmorrhage cannot be arrested by the antiseptic tampon, necessitates splenectomy. Very troublesome hæmorrhage is often met with from wounds of the mesentery.

When multiple perforations of the mesentery and visceral wounds of the stomach or intestines are the source of hæmorrhage, it is a good plan to pack the abdominal cavity with a number of large sponges to each of which a long strip of iodoform gauze is securely tied, these strips being allowed to hang out of the wound in order that none of the sponges may be lost or forgotten in the abdominal cavity after the completion of the operation. The sponges make sufficient pressure to arrest parenchymatous oozing as well as venous hæmorrhage if they are placed at different points against the mesentery and between the intestinal coils. The sponges are removed one by one from below upwards and the bleeding points secured as fast as they are uncovered.

The ligation of mesenteric vessels, both arteries and veins, should be done by applying the ligature *en masse*. Thornton's curved hæmostatic forceps is the most useful instrument for this purpose. Catgut should never be relied upon in tying a mesenteric vessel, as this material, for several reasons which it is not necessary to mention here, is greatly inferior to fine silk. Troublesome hæmorrhage from a large visceral wound of the stomach and intestines is best controlled by hemming the margin of the wound with fine silk. If hæmorrhage is profuse this must be attended to before anything is done in the way of finding or suturing of the visceral wounds.

Search for Perforations.

If the hydrogen gas test has been employed with a positive result before the abdomen was opened, there will be no difficulty experienced in finding the first opening. If the stomach was inflated directly through an elastic tube and the

test has shown the presence of a perforation, a median incision is made from the tip of the ensiform cartilage to the umbilicus and the stomach drawn forward into the wound. If no perforation is found in the anterior wall, the insufflation is repeated, and the escaping gas will direct the surgeon to the perforation. After closing the perforation the stomach is again inflated, and if a second perforation exists it is readily detected by this test. The possibility of the existence of a third perforation should be remembered, consequently a third inflation becomes necessary. A second and a possible third perforation can also be detected by inflating the stomach directly through the first and second perforations.

If the wound implicates the abdominal cavity below the stomach, the hydrogen gas test is applied by insufflation *per rectum*. If the test has yielded a positive result, the lowest perforation is readily found by examining the intestine at a point where the distended and empty portions join, as the leakage of gas through the perforation prevents inflation higher up. In one of my experiments I carried the inflation so far that the intra-abdominal pressure caused by an immense free tympanites not only prevented the inflation of the intestine above the first perforation, but it also forced out the gas from the intestine below the perforation. If, however, the track of the bullet is enlarged down to the peritoneum, as should be done in the diagnosis of all perforating gunshot wounds of the abdomen before the hydrogen gas test is applied, such an occurrence is impossible, as the gas will escape through the external wound as fast as it enters the peritoneal cavity.

If the intestine is found distended below the first discovered perforation, it is an absolute proof that no perforations exist lower down in the intestinal canal, and hence that it is unnecessary to lose any time in looking for perforations in that direction.

As soon as the lowest perforation has been found, rectal insufflation should be suspended. If possible, the perforated portion of the intestine should now be brought forward into the wound, and after emptying the intestine below the perforation as far as possible of its gas, the bowel is compressed below the perforation by an assistant, and the intestine higher up is inflated through the wound. As a matter of course, a perfectly aseptic glass tube should be inserted into the rubber tube instead of the tube used in the rectum. The inflation is now carried as far as the second opening, when the first opening is sutured, and after disinfection the intervening portion of the intestine is replaced in the abdominal cavity. Further inflation is now made through the second opening, and if a third one is found, the second is sutured, and so on until the entire intestinal canal has been thoroughly subjected to the test. By following this plan extensive eventration is rendered superfluous and the overlooking of a perforation is made absolutely impossible. Extensive eventration in the search for perforations, and undiscovered perforations figure largely as causes of death in gunshot wounds of the abdomen treated by laparotomy, and both of these sources of danger are avoided by a thorough and systematic employment of the hydrogen gas test.

Suturing of Wounds of the Stomach and Intestines.

Trimming the margins of the visceral wounds is not only superfluous, but absolutely harmful, as it requires a useless expenditure of time and may become an additional source of hæmorrhage. The same can be said of the Czerny-Lembert suture. All that is required in the treatment of a visceral wound of the stomach and intestines is to turn the margins of the wound inwards and bring into apposition healthy serous surfaces by a few points of interrupted sero-muscular sutures. Fine aseptic silk should be used for the sutures. It is sufficient to use from four to six sutures to an inch. Wounds of the stomach should be sutured in a line parallel with the long axis of the organ. Wounds of the intestine should be closed transversely, with a view of preventing constriction of the lumen. Defects an inch and a half in length on the convex border can be closed safely in this manner without fear of causing intestinal obstruction, while much smaller defects on the mesenteric side often necessitate a resection, not only because the vascular supply in the corresponding portion of the intestine would be inadequate, but also for the reason that a sufficiently sharp flexion might be produced at the seat of suturing to become a source of intestinal obstruction.

Enterectomy.

Enterectomy often becomes necessary in cases of double perforation, and in marginal wounds of the mesenteric border. If in cases of multiple perforations it becomes necessary to make a double enterectomy, and the intervening portion of the small intestine is not more than two or three feet in length, it is best to resect it at the same time, as the immediate effect of the operation will be less severe than a double resection with a corresponding double enterorrhaphy. The mesentery corresponding to the portion of intestine to be removed should be tied in small sections with fine silk before the bowel is excised.

Restoration of the Continuity of the Intestinal Canal after Enterectomy by Lateral Apposition with Decalcified, Perforated, Moist, Bone Plates.

Cases of gunshot wounds of the intestines requiring enterectomy are always grave, and anything which can be done to shorten the operation must add to the chances of recovery. Circular enterorrhaphy requires a great deal of time and is less certain in its results than lateral apposition

with decalcified bone plates, and for these reasons the latter procedure deserves the preference in uniting the bowel after resection for gunshot wounds of the intestine. For the full technique of this part of the operation I must refer the reader to my article read in the Surgical Section of the American Medical Association at its last meeting, and published in THE JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION, June 14, 1890.

Omental Grafting.

If the bowel at the seat of suturing show evidences of contusion, the line of suturing and the damaged portion of the bowel should be covered by an omental graft, which is fastened in its place on the mesenteric side by passing two catgut sutures in the line of the mesenteric vessels through both ends of the graft and the mesentery, and tying them loosely. Before the graft is planted, the surface of the bowel and the surface of the graft which is to be brought in contact with it are scarified with the point of an aseptic needle.

Irrigation of Abdominal Cavity.

This is only necessary if fæcal extravasation or escape of stomach contents has occurred, an accident which, if it has not occurred before the abdomen has been opened, should be carefully avoided during the manipulation of the wounded intestines. Flushing the peritoneal cavity with warm sterilized water not only clears it of infectious material, but acts at the same time as a stimulant to the flagging circulation. After completion of the irrigation the patient is placed on his side, and in this manner the fluid contents of the abdominal cavity are poured out. The cavity is then rapidly dried with large sponges wrung out of a weak antiseptic solution.

Drainage.

Cases which require irrigation also require drainage. Other indications for drainage are visceral wounds of the liver and wounds of the pancreas, spleen, and kidneys, where extirpation of the wounded part of the organ, or the whole organ is deemed unnecessary, and the existence of parenchymatous hæmorrhage which cannot be remedied by any of the different hæmostatic measures.

Closure of External Incision.

Incisions through the median line are rapidly closed by one row of silk sutures which include all of the tissues of the margins of the wound. Incisions made in any other place are to be closed by two or three rows of deep catgut sutures, and a superficial row of silk sutures.

After-Treatment.

Absolute rest must be strictly enforced. Opiates must be given in sufficient doses to quiet the peristaltic action of the intestines. No food should be given by the stomach for at least forty-eight hours. During this time brandy and water in small doses frequently repeated are agreeable to the patient, they quench thirst and exert a favorable influence upon the circulation. If more active stimulation is required to overcome shock and the effects of hæmorrhage, whiskey, ether, musk or camphor can be injected subcutaneously or *per rectum*, while the peripheral circulation is restored by applying dry heat to the extremities and trunk. Should symptoms of peritonitis set in, a brisk saline cathartic should be given at the end of forty-eight hours, as at this time the intestinal wounds will have become sufficiently united to resist the violent peristalsis provoked by the cathartic, while the removal of the intestinal contents and the absorption of septic material from the peritoneal cavity are not only the most efficient means of cutting short a fatal disease, but also of placing the wounds in the most favorable condition for rapid repair.

If the case progresses favorably, liquid food by the stomach can be allowed at the end of the second day and digestible solid food at the end of the first week. Under ordinary circumstances no effort is made to move the bowels until the end of the fourth or fifth day. If early feeding becomes necessary in marantic or exsanguinated patients, this can be done by rectal alimentation. Patients should not be allowed to leave the bed until the external wound has firmly united throughout, as any imprudence in this direction is liable to be punished by the formation of a ventral hernia. The sutures are removed on the eighth day and the patient is directed to wear an abdominal supporter for several weeks after he has left his bed.

SUGGESTIONS FOR THE CONSIDERATION OF MILITARY AUTHORITIES AND MILITARY SURGEONS.

The object of battle is to kill and disable the combatants until the question of victory is decided in favor of the army which exceeds in numbers, or is superior in courage or more skilled in warfare. Very little has been done so far in the way of aggressive surgical interference for heroes who fell mortally wounded in the line of battle in the defense of their country, their ruler, their families, their homes and their rights. The time has come when in case of war adequate provisions should be made on the field of battle near the rear line for the prompt treatment of perforating gunshot wounds of the abdomen. It is difficult to conceive how many valuable lives have been sacrificed on the field of battle during the innumerable wars recorded in the history of the world which now are within the reach of successful surgical interference. Thousands of lives have been lost from internal hæmorrhage alone which could now be saved by an early laparotomy.

In future wars it is the duty of every civilized

nation to do all that modern surgery can do in the treatment of perforating gunshot wounds of the abdomen on the battle field. Every soldier who has been in active military service can recall instances where comrades dropped in the ranks with a mortal bullet wound of the abdomen, who lived for several hours and died from hæmorrhage, often forgotten and uncared for in the excitement of the conflict. Justice, patriotism, humanity and the present status of abdominal surgery demand that in future wars enough men shall be detailed from each company to convey the severely wounded to the rear of the line of battle, where they can receive prompt and efficient surgical aid, and where, if die they must, the last hour of their life shall be peaceful, surrounded by those who will add to their comfort and administer words of consolation as the immortal spirit leaves the maimed body for the future world.

For the purpose of carrying into effect the modern aggressive treatment of perforating gunshot wounds of the abdomen in military practice, it will be necessary to erect a large tent for every brigade, in a safe place, but sufficiently near the line of battle to be within easy reach. This tent should be heated with gas stoves and provided with all the necessary instruments, dressing material and medicines required in the operative treatment of gunshot wounds of the abdominal viscera. One surgeon specially qualified for his work should be detailed to superintend the surgical work, assisted by a sufficient number of reliable assistants. This tent should be used exclusively for the treatment of perforating wounds of the abdomen.

If, as is so often the case in gunshot wounds of the abdomen made with bullets of large calibre, life is threatened by hæmorrhage, the abdomen, after rapid but thorough disinfection, should be opened at once, and after the bleeding has been arrested, visceral injuries of the gastro-intestinal canal should be sought for by applying the hydrogen gas test in the manner described above. The use of this test will not only shorten the time required in the completion of the operation, but it will also guard against two grave sources of danger—extensive eventration and leaving undiscovered and unsutured perforations. Enterectomy will be more frequently made necessary in military than private practice on account of the large size of projectiles used in warfare as compared with those used in private life. Restoration of the continuity of the intestinal canal after enterectomy for gunshot wounds of the abdomen should be done by a method which saves valuable time and secures the best results—advantages which are gained by the use of decalcified, perforated bone plates. Patients who rally from the operation should subsequently either receive the neccessary after-treatment in hospital tents, or should be later transported with the greatest care to the nearest hospital.

The Correct Diagnosis and Proper Treatment of Gunshot Wounds of the Stomach and Intestines Require a Degree of Skill and Dexterity which can only be Acquired by Experiments on the Lower Animals. Even the minutest descriptions of the details to be observed and applied in the diagnosis and treatment of gunshot wounds of the abdomen are utterly inadequate to prepare a surgeon to interpret correctly the symptoms and signs presented by penetrating gunshot wounds of the abdomen, or to meet the often unexpected emergencies in their treatment. Operative courses on the cadaver are valuable and useful, but they never can take the place of experiments on the living animal. This is more especially true in reference to the use of the hydrogen gas test as a diagnostic measure, and the manual dexterity required in the surgical treatment of internal hæmorrhage and visceral wounds. A certain amount of experimental experience is absolutely required in the preparation of the surgeon for the kind of abdominal work which requires not only courage, good judgment, and a thorough knowledge of every step in diagnosis and treatment, but also a manual dexterity which cannot be acquired in any other way.

CONCLUSIONS.

1. In gunshot wounds of the abdomen, in the absence of external fæcal extravasation and prolapse of the omentum, it is absolutely necessary to establish the fact that penetration has or has not taken place by enlarging the wound down to the peritoneum, if the bullet has entered the peritoneal cavity, or in non-penetrating wounds, sufficiently far to show conclusively that the peritoneal cavity has not been invaded.

2. In a fair percentage of cases a bullet which penetrates the abdominal cavity does not produce visceral injuries which require treatment by laparotomy, and such cases, as a rule, recover without surgical interference.

3. Absence of visceral lesions which require treatment by laparotomy is most frequently met with in perforating gunshot wounds of the abdomen, if the wound of entrance is at or above the level of the umbilicus, and if its course is in an antero-posterior direction.

4. In transverse and oblique gunshot wounds of the abdomen at a point below the level of the umbilicus, multiple perforations of the intestines may be confidently expected.

5. The general and local symptoms, with the exception of external fæcal extravasation, are of absolutely no value in the differential diagnosis between simple penetrating gunshot wounds of the abdomen and penetrating gunshot wounds of the abdomen complicated by serious visceral injuries which demand prompt surgical interference.

6. Alarming internal hæmorrhage caused by perforating gunshot wounds of the abdomen can be recognized by the symptoms which characterize progressive acute anæmia, and by the physical signs due to the presence of fluid in the free peritoneal cavity.

7. Dangerous internal hæmorrhage furnishes a positive and urgent indication for treatment by laparotomy. The incision in such cases should be ample and through the median line.

8. After opening the peritoneal cavity for the treatment of alarming hæmorrhage, temporary hæmostasis should be secured by digital compression of the aorta below the diaphragm, or by packing the abdominal cavity with a requisite number of large sponges until the bleeding points can be discovered and the hæmorrhage arrested by permanent measures.

9. The existence of wounds of the stomach and intestine large enough to permit the escape of the contents of these organs can be infallibly demonstrated by the application of the hydrogen gas test before the abdomen is opened.

10. Direct insufflation of the stomach through an elastic tube is preferable to rectal insufflation as a diagnostic test in all cases where, from the location of the wound of entrance and the probable course of the bullet, there is reason to believe that this organ is the seat of injury.

11. The existence and probable location of gunshot wounds of the intestines can be ascertained by rectal insufflation of hydrogen gas.

12. Through insufflation without evidences of free tympanites or escape of gas through the external wound demonstrates either the absence of perforations, or that if present they are too small for leakage to take place; consequently the result of the test is a strong argument in favor of non-interference.

13. The hydrogen gas test should invariably be relied upon in searching for the perforations after the abdominal cavity has been opened, as this method of examination, if properly and carefully conducted, makes extensive eventration unnecessary, and never fails in revealing every perforation.

14. After opening the abdominal cavity for the treatment of gunshot wounds of the intestines, the lowest perforation is pointed out by rectal insufflation of hydrogen gas, but in the search for additional perforations the inflation should be made directly through the perforation last sutured, while the portion of the intestines which has been tested and the perforation sutured is replaced in the abdominal cavity.

15. The external wound should never be closed until the whole length of the gastro-intestinal canal has been subjected to the hydrogen gas test, in order to guard against the possibility of leaving a perforation undiscovered.

16. The hydrogen gas test under ordinary circumstances does not cause fæcal extravasation, and consequently does not increase the subsequent risks from peritonitis.

17. Pure hydrogen gas is most suitable for insufflation of the gastro-intestinal canal for diagnostic purposes, as this substance is non-irritating, non-toxic, and possesses valuable inhibitory antiseptic properties, while its exceedingly low specific gravity adds still more to its value when used for this purpose.

18. By following the indications furnished by the hydrogen gas test the surgeon relieves himself of all medico-legal responsibilities in the operative treatment of penetrating gunshot wounds of the abdomen.

19. A gunshot wound of the gastro-intestinal canal sufficiently large to permit escape of the contents of the stomach or intestines must, for all practical purposes, be regarded as a mortal injury, and on this account its treatment by laparotomy is urgently indicated.

20. Laparotomy in the treatment of gunshot wounds of the stomach and intestines should be performed as soon as possible after the infliction of the injury, and always before a septic peritonitis has had time to develop.

21. The closure of bullet wounds of the stomach and intestines is accomplished most speedily, and with a sufficient degree of safety by the application of one row of interrupted seromuscular sutures of fine aseptic silk.

22. If enterectomy becomes an unavoidable necessity in the treatment of gunshot wounds of the intestines, the continuity of the intestinal canal should be restored by making an anastomosis between the closed ends by lateral apposition with decalcified, perforated, moist, bone plates, as this procedure requires less time and accomplishes the desired result with a greater degree of safety than circular enterorrhaphy.

23. Flushing of the abdominal cavity is to be reserved for cases in which the peritoneal cavity has become contaminated by escape of the contents of the stomach or intestines.

24. Drainage becomes necessary in cases in which the peritoneal cavity has become infected, also in injuries of the liver, and in wounds of the spleen, kidney or pancreas not treated by partial or complete extirpation of the injured organ.

25. The adoption of adequate provisions for the prompt, aggressive treatment of perforating gunshot wounds of the abdomen in hospital tents in the rear of the line of battle, should receive the most serious consideration of military authorities, and military surgeons who will have charge of the wounded in the wars of the future.

26. The necessary diagnostic skill, and requisite manual dexterity in the operative treatment of gunshot wounds of the stomach and intestines, can be acquired only by experiments on the lower animals.

MEDICAL PROGRESS.

DISINFECTING POWER OF PEROXIDE OF HYDROGEN (H_2O_2).—DR. ALTEHOFER of Rostock, gives us, in the *Cent. f. Bakteriologie und Parasitenkunde*, a careful study of the disinfecting power of this substance, for which he claims the especial merit that it does not alter the appearance, taste or smell of water to which it has been added.

The first experiments were made with spring water, the second with hydrant water and a third with river water. The first contained 560, the second 180, and the third 1800 germs in each cubic centimetre. To these several waters were added H_2O_2 in the proportion of 1:5000 and 1:10000, and after an exposure of 24 hours inoculations of gelatine and agar-agar were made. In each case abundant colonies developed, but those from the weaker solution were in greater number and more vigorous.

A second series was made upon hydrant water to which sewage had been added in the proportion of two per cent. and one-half per cent. The solutions were not sterilized even when H_2O_2 was added in the proportion of 1:2500.

Observations were made upon solutions containing H_2O_2 in the proportion of 1:1000. Three samples of potable water were used containing respectively, as was ascertained by cultivation, 160, 600, and 6,000 germs per cubic centimetre. The results in these three cases were, at the end of the seventh day, for the first sample three colonies, the second two, and the third ten. While this shows that the peroxide, in the proportion of 1:1000, is not sufficiently powerful to destroy all the ordinary germs of drinking water, it will destroy the greater number. Solutions of this strength impart a slight metallic taste to water, but this disappears shortly after it has been added. To 100 cubic centimetres of sterilized water one-half ccm. of sewage was added and one ccm. of H_2O_2. This mixture was found to be absolutely sterile at the end of twenty-four hours.

Experiments made with the typhoid and cholera bacillus showed that they were completely destroyed when H_2O_2 was present in the proportion of 1:1000.

The author recommends the disinfection of drinking water by this means in times of epidemics not only from its efficiency and cheapness, but also because the potability of the water is not altered.

THE GRIPPE CONSIDERED FROM A SURGICAL STANDPOINT.—The recent epidemic of la grippe has called into requisition the services of the physician rather than of the surgeon, but an article by PROF. VERNEUIL, published recently in the *Bulletin de l'Académie de Médicine*, shows that the disease presents many points of surgical interest. M. Verneuil points out that in most of the surgical affections caused by the grippe, the main pathological feature is suppuration. Thus he observed suppurative inflammations of the eye, ear, joints, purulent pleurisy and pericarditis, the formation of superficial or deep abscesses of the skin and glands, and collections of pus in the antrum of Highmore and frontal sinus. These conditions were treated by appropriate surgical measures, but it was found that the prognosis was less favorable than under ordinary circumstances. This is not surprising, since the grippe, like other acute infectious diseases, causes marked depreciation of the patient's general health and therefore adds materially to the dangers of any surgical operation that may have to be undertaken. Aside from this, it was observed that when patients who were in the stage of recovery from an operation were attacked by the disease, the complication gave rise sometimes to serious consequences. M. Verneuil therefore lays down the rule that excepting the conditions above mentioned, where urgent surgical interference may be indicated, it is better to postpone all surgical measures until the patient has recovered from the grippe. Owing to the slow and tedious convalescence which characterized the disease, it may not be possible to delay the operation until recovery is assured, and in this case the best that can be done is to improve the patient's general condition as much as possible by appropriate medication.

According to the observations of DRS. BERGER and PEYRAT, surgical diseases ran the same course during the prevalence of the grippe as under ordinary circumstances. On the other hand, DR. WALTHER, of the Hospital de la Charité, states that patients who developed the grippe shortly after operations in which the wound was not immediately closed, as in the treatment of cold abscesses, exhibited a remarkable slowness of the healing process. Cicatrization was arrested to a certain extent, and was not re-established until several days after the complete cessation of the acute febrile symptoms. In the case of wounds sutured without drainage, healing was not interfered with, but usually two or three days after operation a sudden rise of temperature was observed. The cause of this fever could not be demonstrated, since on removal of the dressings the wound appeared perfectly healthy.

DR. DEMONS, of Bordeaux, mentions quite a number of surgical complications of the grippe which have come under his observation. Otitis, complicated by suppuration in the middle ear or mastoid cells, was met with in several instances. Severe inflammation of the eye occurred in some cases, while in still others an orchitis was suddenly developed without a previous history of gonorrhœa or contusion of the testicle. Fortunately, however, this disappeared as rapidly as it had appeared, without going on to suppuration.

There was also a formation of abscesses in the axilla, in the iliac region, and upon the leg, although none of the ordinary causes of suppuration could be found to exist. M. Demons states that all wounds in the wards of the hospital were slow in healing, and in many instances suppurated profusely. In his opinion, during an epidemic of the grippe it is necessary to abstain from all operative procedures, but especially those involving the buccal, nasal, pharyngeal and respiratory tracts, which are especially apt to be attacked by the disease.

Judging from these observations, the prognosis of operations performed during the grippe is worthy of careful consideration, and, if possible, all surgical measures should be postponed until the patient has recovered from the debilitating effects of the disease.—*International Journal of Surgery.*

CLOSTRIDIAL NEPHRITIS—A NEW FORM OF BRIGHT'S DISEASE.—DR. F. V. HOPKINS, of San Francisco, contributes an original, and apparently carefully carried out, bacteriological research to the *Pacific Medical Journal*. It is based upon the observation of a case of chronic nephritis, due, as he believes, to a peculiar microörganism which he terms "Clostridium renale." The description of the germ is as follows:

Circular cocci, 1.27 μ in diameter; rods, with rounded ends averaging .6 μ in thickness by 3 μ in length, sometimes enlarging characteristically to bear a sporangium, oval in form, and measuring 1.27 × 2.5 μ. Spores circular, .42 μ in diameter. Filaments of indeterminate length, sometimes .6 μ thick throughout their whole extent, at others, 1.7 μ at one end and tapering at the other into branches, whose ends separate by fission into the usual round-ended rods .6 μ thick by 3 μ long. Non-motile, pathogenic, infests the blood and is carried by it to the capillaries of the principal organs, which it obstructs.

This organism produces a chronic affection of the kidneys and other organs of the body, characterized by nervousness, sleeplessness, flatulent dyspepsia, albuminuria, dropsy, dyspnœa, and heart-failure. The occurrence of the germs in the urine, free and in casts, is its pathognomonic symptom.

The particular case in question, upon which the description is based, was that of a woman who suffered from nervous depression, dyspepsia, insomnia, and cardiac weakness. Her urine contained various peculiar forms of albumen. Delafield gives tests by which six different varieties of albumen are distinguished. Dr. Hopkins' patient passed still other varieties than these. We are not told the specific gravity of the urine, its daily amount, or that of the albumen, and in this and some other respects there seems to be a lack of careful clinical observation. Casts were found, however, which were composed entirely of bacteria, occurring in the form of rods with rounded ends. These bacteria were cultivated under proper precautions, and inoculations were made in rabbits with the result, invariably, of causing albuminuria, dropsy, and death, with the bacteria in the kidneys and other tissues. The patient died, but no autopsy could be made.

Dr. Hopkins' claim to have discovered a new and peculiar form of nephritis cannot be said to be absolutely established, but he has done a service in calling attention to the importance of the bacteriological study of renal casts. The similar studies in bacteriological nephritis which have been made by others are given by the author, thus:

Babes, in Cornil et Babes' "Bacteriologie," p. 373, Figs. 197, 198, has described the "Bacille de la nephrite bacterieuse." "Cylindrical rods, with rounded ends 0.8 μ to 1 μ thick, and of very variable length, sometimes 1.6 μ to 2 μ and sometimes 20 to 50 μ, and sometimes curved. Habitat, in the urine and renal tissues of patients with diseased kidneys."

In 1880, Dr. Ballard reported a case of meat-poisoning that occurred at Welbeck, Nottinghamshire, England. Four died out of seventy-two that were affected. Bacilli were found plugging the capillaries of the Malpighian bodies in the kidneys, though the symptoms were choleraic. The tube-casts were of the hyaline variety (Klein, "Microörganisms and Disease," pp. 122–125).

The bacilli of swine-plague also attack the Malpighian corpuscles, but here the bacilli occupy the capsule, the capillaries being plugged with hyaline matter (*Ibid.*, p. 133).

Again, the bacillus anthracis may completely plug the capillaries of the glomeruli and of the renal cortex (*Ibid.*, Fig. 87, p. 160).

Bacillus tuberculosis also can obstruct the blood-vessels of the kidney (*Ibid.*, Fig. 92, p. 171).

The fungi Aspergillus flavescens and A. fumigatus, when injected into the peritoneum of rabbits, proved fatal by forming foci in the kidneys and other organs (*Ibid.*, p. 200; Lichtheim, in *Berlin Klin. Woch.*, 9 and 10, 1882).

Letzerich describes twenty-five cases of an acute dropsy of young persons, which he calls "nephritis bacillosa interstitialis primaria." This disease lasts from two to six weeks, and is due to bacilli which swarm in the urine. Twelve rabbits inoculated with pure cultures of these bacilli developed ascites in about fourteen days. The bacilli occurred "at the junction between the pyramidal and cortical portions of the kidneys" (*Zeitschrift für Klinische Medicin*, 1887).

Perhaps the criticism which may be more effectively made against Dr. Hopkins' claim to have discovered a new form of nephritis is that his case was one of general microbic infection, and that the kidneys were not the primary or chief centres of the morbific action.—*Medical Record.*

ON PSYCHOSES AFTER INFLUENZA.—KRÄPELIN (*Deutsche med. Wochenschrift*, 1890, No. 11) has observed a development of mental disorder after the departure of influenza in eleven instances. Among these were cases of simple psychical depression, of melancholia with delusions, acute states of exhaustion resembling the delirium of collapse, typical mania, and delirium tremens. The outburst of the psychical attacks regularly supervened at once upon the expiration of the bodily morbid phenomena; so also no elevation of temperature was ever noticed. The especially active causes of these psychoses was, therefore, apparently to be sought rather in the general enfeeblement of the organism than in the particular nature of the intoxication or toxæmia. The prognosis of these psychoses is very favorable; the treatment must be a generally strengthening one.

PLUMBISM AND ALCOHOLISM.—At a recent meeting of the Academy of Sciences, Paris, M. CHARCOT read a note on some experiments in plumbism carried out by MM. Combemate and François. They caused from one to five centigrams of carbonate of lead to be consumed daily by animals. At the end of about a month the nervous symptoms of saturnine poisoning made their appearance—such as epileptic fits, delirium, etc.—just as they are observed in man. This was, of course, not new; but the interesting point was that in certain of the animals experimented upon the administration of large doses of alcohol was found to hasten in a remarkable manner the advent of the nervous symptoms. The same thing was noticed when others of the animals were subjected to any abrupt emotional shock, such as fear. These facts were worthy of note, for in man a similar precocity of the nervous phenomena of plumbism was observed whenever those already suffering from lead poisoning were subjected to a moral shock or became addicted to alcohol.—*Lancet.*

OSTEOGENESIS.—On Tuesday, August 5, PROFESSOR OLLIER, of Lyons, read a paper on this subject at Berlin. He began by considering the growth of bone in general, and gave a full account of his researches into these questions, in which by a series of experiments performed on animals, as well as in consequence of the numerous operations which he had performed on man, he had been led to the following conclusions: New bone could in reality be formed from the periosteum alone, and only under certain well-known conditions. It was perfectly hopeless to expect any complete and permanent growth of bone to take place unless the periosteum surrounded it. It was, indeed, true that if the parts were aseptic for a time, the new bone, or implanted bone, as the case might be, seemed to grow, but this was only for a time. Within six months necrosis took place, and the dead bone, if loose, was thrown off, or might remain encysted in some instances, and, if it did no harm, was certainly of no advantage to its possessor. This was a fact which had been known for many years, and there was, he believed, notwithstanding what had been said to the contrary, no exception to it. If a more minute examination were made of the implanted bone, it would be seen that the changes which took place in it were as follows: It was penetrated by blood-vessels from the surrounding bones and tissues, but these vessels played no part in its nutrition, but served only to further its absorption. Perhaps no more striking evidence of the value of the periosteum could be given than the following: On one of his patients, a young woman, he had operated three times, resecting her elbow-joint on each occasion, but the periosteum had been retained, and on each occasion she had made an excellent recovery. Practically there were three kinds of plans which might be employed, which might be styled: 1, autoplastic, in which the same bone was used to repair some deficiency in itself, and the bone was only partially severed from its connections—as, for example, where a piece of bone was turned down from the forehead to make a new nose; 2, the second of these plans was well described as homoplastic—that is, when the graft is taken from the same individual, but not from the same bone; 3, the third, or heteroplastic, plan is applied to those cases in which a bone of some other individual or animal is made use of. The first and second plans were all but useless, and the third quite so—that is to say, the implanted bone could not ever grow. With regard to the question of excisions, it was, of course, a case for either movement or anchylosis. He had nothing to say, except that in the lower limb we must always have anchylosis, and in the upper movement, though an exception might, perhaps, be made in the case of the wrist, where a fixed or partially fixed joint would be more useful to the patient than a movable one.—*Brit. Med. Journal.*

SALT IN MILK FOR CHILDREN.—DR. A. JACOBI (*Arch. of Ped.*) says that the addition of sodium chloride prevents the solid coagulation of milk by either rennet or gastric juice. The cow's milk ought never to be given without table salt, and the latter ought to be added to a woman's milk when it behaves like cow's milk in regard to solid curdling and consequent indigestibility. Habitual constipation of children is influenced beneficially, since not only is the food made more digestible, but the alimentary secretions, both serous and glandular, are made more effective by its presence.

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SATURDAY, SEPTEMBER 13, 1890.

EMPYEMA.

The impunity with which the peritoneum is subjected to operative interference depends not so much upon antiseptic methods as upon the germicidal action of the peritoneum itself. This action has been shown by RINNE[1] to be sufficient to remove, every few days, a few cubic centimetres of injected pus. The experience of operators also leads them to place the greatest reliance on the uninjured peritoneum to remove small amounts of infective material. Although the investigations of KNECHT[2] show that the healthy pleuræ of animals absorb with ease small amounts of pure cultures of pyogenic bacteria, the germicidal action of these surfaces is noticeably less than that of the peritoneum. The pericardium and the serous surfaces of the meninges offer almost no resistance at all to infection. This phenomenon the writer holds is due to an immunity acquired by the peritoneum through its proximity to infective material within the intestinal canal. The danger of the pleural cavities to infection is less, and therefore less resistance has been evolved, while the opportunity of the remaining serous cavities to infection is so small that their resistance is at a minimum.

Next to the peritoneal, then, the pleural cavities offer the greatest opportunity for, and the greatest hope in operative treatment. The history of empyema is one full of mournful disasters. Its diagnosis has often been delayed or mistaken. Usually secondary, it has been confounded with every condition which it follows, and the unhappy patient has been allowed to die and be buried with a mistaken diagnosis. Phthisis (pulmonary tuberculosis) has not only had cases added to its mortality, but records some of its most remarkable recoveries through these errors, and mania and insanity have suddenly been cured by the evacuation of a suppurating pleura.

During the past half year, an unprecedented number of cases of suppurative pleuritis have been observed. In Cook County Hospital only two cases of empyema were treated in 1889, while during the first six months of 1890 fifteen cases were admitted with this diagnosis. Almost every practitioner could report a similar condition of things in his own private practice, and a careful examination will show that the influenza was the primary disease in the great majority of cases.

The origin of these empyemas may be set down something in this manner: General infection of the blood with influenza and consequent saturation of its germicidal quality; invasion of portions of the lung with pneumonia-producing parasites, and consequent interruption of the lymph-currents from the pulmonary pleura over the affected area, resulting in serous pleuritic effusion; invasion of the lymph spaces in the pneumonic area by pus-producing bacteria which advance from the larger to the smaller bronchioles to the lymphatics, and then are carried in the lymph in its abnormal course into the pleural cavity. Here the bacteria multiply in the effused serum until the pleural surfaces are so modified by the products of bacterial growth that absorption is arrested and these surfaces become one continuous pyogenic membrane.

Suppurative disease in the pleuræ is of the same destructive and progressive nature which is so well recognized elsewhere, and it should be attended with the same prompt and radical treatment. The peculiar contractile power of the lung which causes it to collapse as soon as the atmospheric pressure is admitted through a defect in the thoracic wall, has led to the surgical neglect of this region. However, the indications in cases of empyema are well defined: evacuation of the pus, arrest of the suppuration, and restoration of the function of the parts.

The early evacuation of the pus with the aspirator accomplishes the first and last indication temporarily; and, when continuous aspiration

[1] Langenbeck's Arch. f. Klin. Chir., 1889.
[2] Inaugural Dissertation, Greifswalde, 1889.

after the manner of BULAN is practiced, it meets all the indications better than any method yet proposed. But the patient requires constant trained attendants, and his intelligent and patient cooperation is necessary to success. The method, moreover, is inapplicable to cases of fibrinous or fibrino-purulent pleurisy, and it is liable to serious interruptions and accidents when successfully initiated. Nevertheless it is the only method that can be thought of in bilateral empyema, and in unilateral empyema with loss of function of the opposite lung from pneumonia or other cause. Even if it be followed by incision of the thoracic wall and open drainage, it may limit the cavity so that the lung will suffer trifling collapse.

For cases removed from the possibility of constant trained assistants, the excision of a portion of rib and free drainage through the defect, is much to be preferred and it can be relied upon in most cases. Its application is so well understood that further mention is unnecessary. It is the only method which can be practiced in tubercular empyemas and in cases accompanied by permanent collapse or extensive gangrene of the lung, and in pneumo-pyo-thorax from perforation into a bronchus. It may frequently be necessary to supplement it in the worst of these cases with ESTLANDER'S operation.

Simple incision between the ribs can not be recommended as a safe procedure. It has been tried, with and without drainage tubes, for years, but with the most disastrous results. While it gives temporary relief, it offers, except in children, small hope of permanent recovery. Nevertheless, WM. E. QUINE has lately so modified this operation that it has in his hands given the greatest hope of usefulness. The incision is made into the center of the empyemic cavity at upper border of a rib. The pus is washed out once or twice daily with the most scrupulous antiseptic precautions. The thorough disinfection of the cavity is all the time kept in mind. When, after a week or ten days, more or less, the discharge becomes serous, the antiseptic irrigations are redoubled in amount and care for a few days, and then, after one grand attack on any remaining infection, the tube is removed and the incision stopped with a mass of iodoform, and the thoracic wound covered with an occlusive antiseptic dressing for two weeks. Under this treatment he has repeatedly had large tympanitic thoracic cavities close in ten days, all the air being absorbed as well as any serous or purulent discharge, and what infective material the antiseptics have spared. The writer, on the suggestion of Prof. Quine, has practiced this method on a boy seven years old with the most happy results. A cavity holding at least three ounces, after daily antiseptic irrigation for two weeks, was permanently closed and the boy has remained well for three months. The writer believes that in proper cases and in proper hands this will be found a most satisfactory treatment. It must be instituted early. It must be conscientiously carried out until an approximately aseptic condition of the cavity is secured, or, better, until the absorptive power of the pleural surfaces is restored. Then the incision must be so closed that all ingress of air is prevented by the coaptation of the lips of the incision while the air within the cavity is absorbed, or forced out of the incision by coughing.

THE CRIME OF OVER-STATEMENT.

In the candid study of reported cases, there is apparent to the critical mind, an element of incredibility, which will not down at the bidding. We are ready to admit that this is not a constant factor, but merely that with all the hedging that it is quite frequent enough to deserve criticism. There is somehow an over-writing, a curious blending of the probable with a suggestive caution lest the tale be too well told. These are the arts of the shrewd writer, well up in the tricks of his craft. Parallel instances do not and are not expected to yield like results in other hands. Failure is to be attributed to lack of skill, knowledge or judgment.

Much may be allowed for the enthusiasm of the advocate of a new mode or principle, but there is altogether too much glossing and too much of the spirit of self-complacency to yield results of permanent value. This strife for immediate recognition, and this pushing to the front at all hazards, although for a season successful to the individual, only resolve themselves into examples of disaster to science at large. Men shake their heads and take refuge in a general disbelief, which stifles progress.

Now we hold that much more is to be learned from confessed errors of logic and mistakes in

diagnosis, than by any pandering to a personal vanity or assumption of infallibility. An unsuccessful issue, incapable of any avoidance in reality benefits more, when, conscientiously stated, than the most brilliant jumping at conclusions. We desire to give to this expression the utmost force, especially if the prevarication be deliberate. In all contributions to the medical press, the ideas involved may be worthy of perpetuation; then more is the pity if they be over-stated. What harm, therefore, if the foresight and ingenuity of other investigators bring to the task of unravelment a fresher mentality and more unprejudiced views. Any truth may be spoiled by too much drapery. Facts, in this our age, where BACON holds such a sway, can well afford to stand without propping. Facts, too, none of us need be told, are the known quantities in our mathematics, no less than in other departments of learning. HIPPOCRATES as an observer of the phenomena of disease will stand the test of ages yet to come; and DARWIN as a classifier of facts, will stimulate thought as long as the language in which he wrote is known. Why such enthronement? Why, because, in both the cardinal virtue was honesty.

In this, our writing, we are hinting at no delinquents in particular, but are disposed to denounce tendencies, customs and motives. Offenders are legion, and worst of all unconscious of their faults—they only know their neighbors, whom they would willingly punish. We admit that the temptations for a cheap acquirement of fame are various, that patience in classification is ignored, and that much latitude is given to fiction; but there can be no excuse for misleading the trusting by claims that are extravagant. We also allow that testimony is fallible, but cannot yield the point that falsehood, either deliberate or suggestive, can ever be utilized for any good. Let us have clear, succinct histories devoid of attempts at embellishment, and those artifices of concealment which mar rather than strengthen; let us not depend upon any one instrument of precision, nor let our vista be limited by any one field. When we become convinced of the more truthful methods of procedure, we shall come to comprehend broader laws, and to anticipate some of the grander discoveries, which may have been intended for reservation to posterity. Our moral is obvious, less self-appreciation but more labor for the general good.

GOVERNMENTAL INVESTIGATION REGARDING SPIRITUOUS LIQUORS.

An official enquiry by PROF. LYON PLAYFAIR'S committee on British and foreign spirits and their adulteration, at the laboratory of the Inland Revenue Department, has been made unusually interesting from the fact that one of the members, MR. HEALY, obtained specimens, from the House of Commons refreshment bar, of the Scotch and Irish whisky dealt out to the honorable members. The report of the analysis has not been published. But there has been published the evidence of DR. BELL, principal chemist at the laboratory above mentioned, regarding the brandy obtainable at the drinking places in London, to the effect that only four out of five were genuine, the other samples consisting of purified spirit flavored and colored. The mellowing of whisky, according to Dr. Bell, is a very uncertain element. He has seen a three-year old specimen which had lost none of its fusel oil, although generally speaking the time required in the mellowing process depends mainly on the amount of that oil present when the liquor is fresh from the still. Hence it is, as might be expected, that a great difference can be detected between the products of different distilleries. The chemical changes, which attend the mellowing of whisky, are not fully understood, although they are known to consist in part in the breaking up of fusel oil into aromatic ethers, but the same changes will certainly not always occur in different samples kept under conditions closely analogous. Dr. Bell states that he obtained fifty samples from the lowest public-houses in various British towns, and his analysis resulted in showing that the spirits were satisfactory in regard to purity, and that the injurious adulteration of alcoholic beverages is far less frequent than is commonly reported.

ELEMENT OF CONSENT IN SURGICAL OPERATIONS.

Apropos of a recent editorial in the *Medical Record* on "The Responsibility of the Physician for Experiments upon Patients, even with the latters' Consent," we are reminded of the exhaustive discussion upon "The Medico-Legal Relations of Abdominal Surgery" held in the Section on Jurisprudence at the last meeting of the American Medical Association. In that dis-

cussion, the necessity of obtaining the consent of the patient and friends, before proceeding to open the abdomen, was especially insisted upon by several speakers, and from this the discussion branched to the element of consent generally in surgical operations. The view most readily accepted in that meeting was that more than simple consent was required in surgical operations—while that was essential; the operation itself must be in the line of approved surgical procedure. A case was quoted in which a young man had his testicles removed because of amorous proclivities. He subsequently married and sued the physician for malpractice, notwithstanding the fact that the operation was undertaken with his full consent, indeed it was solicited. The case was settled out of court by the payment of a round sum on the part of the physician.

Responsibility in these cases is a complicated legal question. But we incline to the view that the mere element of consent is not sufficient to absolve the medical man from responsibility, unless the operation is within the recognized limits of medical or surgical procedure. It will not protect the physician in performing bizarre operations, or in reckless experimentation.

While we sympathize with the physician, mentioned by the *Record*, who was mulcted in small damages, we are not unmindful of the painful abscesses in the paralyzed limbs of the too credulous patient.

EDITORIAL NOTES.

PROF. SILAS H. DOUGLAS, M.D.—Dr. Douglas, says the *American Lancet*, died at his home in Ann Arbor, August 26, aged 74. He was for thirty-three years Professor of Chemistry in Michigan University. His genius organized the chemical laboratories of the University. For many years these had no equal in the United States. Much of the special value of the medical course was due to the exceptional advantages of these laboratories. Following Dr. Douglas Houghton in his occupancy of the Chair of Chemistry, he had the fullest opportunity to carry out his plans of teaching. He will doubtless be long remembered by his connection with the famous Douglas-Rose controversy, that kept at a white heat scientific, social, educational, and political interests of the dominant power in the State. He was an exceptionally good business man for a doctor and a professor, and so was enabled to leave a large estate.

DEATH FROM POST-MORTEM ACCIDENT.—Dr. John Henry Love, formerly Health Officer at Wolverhampton, England, lost his life in consequence of an unusual accident in the post-mortem room. In the course of an autopsy he was engaged in opening the calvarium, when the hammer he was using slipped from the head of the chisel, and he received a sharp blow on the thumb of his left hand. The wound thus caused was immediately sucked and other treatment employed, but not sufficiently well to prevent septic infection, with cerebral symptoms, which resulted fatally three months after the accident. Perhaps the most important point of information to our readers, in this narration, may be in the fact that the lethal hammer-blow was given by one of those instruments that have one end of the head sharp and the other flat, and that in delivering the stroke the operator unfortunately had the sharp end towards the head of the chisel. Not unnaturally the hammer slipped, with the distressful results above described; all of which goes to show how life may hinge on a trifle of want of care and attention. In the post-mortem room, especially, these trifles must be rated as extra-hazardous.

THE MEDICAL EDUCATION OF WOMEN IN RUSSIA.—The reopening of the Woman's College of Medicine at St. Petersburg has been ordered by the Government. A building belonging to the municipality has been set apart for its temporary occupancy, and an annual grant amounting to about $15,000 will be contributed by the city towards its support. The hospitals of the city will be accessible to the female students. The donations of private citizens will be relied upon, in considerable measure, to establish the college on a substantial basis. The college has already graduated not far from 700 lady physicians. The decision of the municipality to open the institution anew was brought about in consequence of a favorable report by Dr. Archangelsky, who has observed the good results of the work done by eleven female medical inspectors, employed by the city, to have oversight of the public schools and the *pauvres faubourgs* of St. Petersburg. Some of

these Russian ladies have found their way to Smyrna and other cities of the Orient, but far the greater number have remained in their own country, which suffers under a dearth of practitioners of medicine.

DR. FRIEDRICH ARNOLD, the eminent pathologist, died in Heidelberg on the 7th ult. No German professor is better known in America, nor one who has taught personally so many of the younger generation of medical men.

CHOLERA IN SPAIN; MALTREATMENT OF THE GOVERNMENTAL PHYSICIANS.—The strange behavior of the Spanish peasantry towards the medical men, who have been sent among them to save their lives, is like a page out of some mediæval chronicle. If the facts have been truly related to us by the cable despatches, not less than three cholera physicians have been killed by the mob, and many have been violently assaulted without cause. The health physicians have, in some places, refused to go on with their work unless protected by the military. Wherever they have gone, in the country districts, they have encountered the same wild panic-like antagonism, although their errand is plainly declared by them to be to save the lives of other people, at the risk and exposure of their own.

THE REPUTED CASE OF CHOLERA IN LONDON.—Great excitement prevailed in London recently following the announcement that a typical case of cholera had occurred in the person of a sailor landed at the Victoria Docks. On admission at the Poplar Hospital he was suffering marked collapse, cyanosis, cramps and violent vomiting. While these clinical symptoms point to Asiatic cholera, still the fact that there were no other cases during the voyage, and that no new cases are being developed, leads to the conclusion of his medical attendants, who have given the case every attention possible, that it is one of cholera nostras or cholera morbus, and not Asiatic cholera.

THE AUSTIN DISTRICT MEDICAL SOCIETY will hold its twelfth quarterly meeting at Austin, Texas, on Thursday, Sept. 25, 1890. A full programme of papers is published, and an interesting meeting of Texas physicians is assured.

THIRTY-TWO physicians of Bordeaux have volunteered for service at the frontier in preventing the spread of cholera.

CHOLERA.—The advices with reference to this disease during the current week have been favorable. Though prevalent in the provinces of Spain, the adjacent territories of France and Portugal are still exempt. It is less fatal in the localities previously infected, and in its progress westward it has been nearly at a stand. The report of a case in London proves to be ill-founded, and the advance to Western Europe by way of the Black Sea seems less and less probable. The heat of summer past, we may reasonably anticipate that for winter, at least, its general westward progress will be controlled.

PERSONAL UNCLEANLINESS AS A FACTOR IN THE CAUSATION OF CHOLERA.—In the *Gazette Médicale d'Orient* Dr. Gabuzzi cites Rochefontaine's experiments going to show that the microphyte of cholera is sterile within the patient's organism, and that, in order to be rendered capable of conveying the disease, it must find a nutritive soil on being cast off from the system. The urine, he thinks, often constitutes a medium in which it may attain pathogenic powers, and uncleanliness, which favors the mixture of urine with the bacillus, may therefore be regarded as a predisposing cause of cholera.

CHOLERA IN JAPAN.—This disease has become prevalent in various parts of Japan, and it is quite possible that it may reach this continent by the western route rather than by the way of the Atlantic ports. Cases are reported in Tokio, and in Yokohama, the great center of commerce, a number of cases are reported.

PARIS is now receiving milk directly from the provinces, in sealed glass jars. This not only prevents contamination, but also fraud on the part of the retail dealer.

PROF. V. NUSSBAUM, of Munich, has, through ill health, been compelled to resign the position of director and professor at the University surgical clinic. Prof. Augerer has been intrusted with its provisional conduct.

SINCE 1866, 202 women have received diplomas in France, of whom 35 were doctors of medicine, 67 bachelors of letters, 69 bachelors of science, 13 licentiates, and 2 pharmacists.

IN the rue Fessart, Paris, there has been established a house of refuge for women, modelled somewhat after the plan of industrial homes.

TOPICS OF THE WEEK.

PAST CONGRESSES.

The Berlin correspondent of the *British Medical Journal* prefaces his report of the late Medical Congress with the following brief reference to the past Congresses:

"Before proceeding to give an account of the scientific and general work of the great medical gathering now being held at Berlin, it may be well to glance backwards for a moment at the similar meetings which have taken place in past years. The history of this important periodical event in the world of medicine is interesting as showing its almost casual mode of origin, and the way in which it has developed from comparatively humble beginnings into one of the most powerful factors in the advance of knowledge and the promotion of community of effort, professional solidarity, and good-will among the members of our body throughout the world. Although an international hygienic congress was held at Brussels so far back as 1852, the International Medical Congress, as we now know it, is of much more recent date. Our French neighbors claim the merit of having originated the idea, but the first meeting which was held at Paris in 1867 appears to have been little more than an accidental expansion of the annual Congress of French medical men, which was being held in the ordinary course, by the addition of a considerable foreign contingent formed by the medical visitors of various nationalities who had gone to Paris at the same time to see the great exhibition of that year. The scientific guests, who numbered about 500, were received by their French hosts with all the courtesy characteristic of the *grande nation*, and representative men of the different leading nationalities were chosen Vice-Presidents, among them, it is interesting to recall, being Professor Virchow, some of whose later utterances recently furnished Dr. Huchard with a text for a vehement call to all patriotic Frenchmen to boycott the Berlin Congress. The proceedings at the Paris Congress were almost purely scientific, with little or none of the festive element, which has been so prominent a feature in most of the subsequent gatherings. Moreover, French was the only language recognized at the meeting. The assembly, such as it was, however, was so successful that on the motion of an Italian physician, Dr. Pantaleoni, it was determined to make an International Medical Congress a regular institution, the meetings to be held every two years. In compliment to Dr. Pantaleoni, Italy was fixed upon as the place for the next meeting. It had at first been intended to hold the second Congress at Rome, but as there were some doubts as to the willingness of the Papal Government to furnish facilities for the meeting, Florence was chosen, and a gathering was held there in 1869, in which 87 foreign practitioners took part. Owing to the outbreak of the Franco-Prussian war, the third Congress was not held till 1873, when a successful meeting took place at Vienna, again contemporaneously with a Universal Exhibition. The veteran pathologist Rokitansky was the president on that occasion, which is memorable in the annals of medicine for the part assigned to discussions on important hygienic questions, such as the prophylaxis of cholera, compulsory vaccination, etc. At Vienna, also, it was decided that at future meetings there should be three official languages, namely, German, French, and English. The fourth Congress was held at Brussels in 1875. The King of the Belgians took so much interest in the proceedings that he was present at many of the sittings. It was at this meeting that the Congress was first divided into Sections. The fifth gathering was at Geneva in 1877, under the presidency of the illustrious biologist, Karl Vogt; the sixth at Amsterdam in 1879, under the presidency of Donders, whose death ophthalmology and physiology will long continue to deplore. The next meeting, which was held in London in 1881, marks an epoch in the history of the Congress. Some 3,000 practitioners, including about 1,000 foreigners, took part in it. It was divided into sixteen Sections, which held 190 sittings, giving a total of 293 hours of work. The number of communications amounted to 325. The social aspects of the London Congress were not less brilliant than the amount and quality of its scientific work. Of the meetings at Copenhagen in 1884, and at Washington in 1887, it is needless to say anything more than that, though very successful, they did not eclipse the splendor of the London gathering."

LIGHT IN THE SICK ROOM.

Still a custom prevails despite all our sanitary teachings, that the occupant of the sick room in the private house should be kept at all hours in a darkened room.

Not one time in ten do we enter a sick room in the day time to find it blessed with the light of the sun. Almost invariably before we can get a look at the face of the patient, we are obliged to request that the blinds may be drawn up that the rays of a much greater healer than the most able physician can ever hope to be, may be admitted. Too often a compliance with this request reveals a condition of the room which, in a state of darkness, is invariably one of disorder everywhere; foods, medicine, furniture, bedding misplaced; dust and stray leavings in all directions.

In brief, there is nothing so bad as a dark sick room. It is as if the attendants were anticipating the death of the patient; and, if the reason for it be asked, the answer is as inconsistent as the act. The reason usually offered is that the patient cannot bear the light, as though the light could not be cut off from the patient by a curtain or screen, and as though to darken one part of the room it was necessary to darken the whole of it.

The real reason is an old superstitious practice which once prevailed so extensively that the sick, suffering from the most terrible diseases—small-pox, for instance—were shut up in darkness, their beds surrounded with red curtains during the whole of their illness. The red curtains are now pretty nearly given up, but the darkness is still accredited with some mysterious curative value.

A more injurious practice really could not be maintained than that of darkness in the sick room. It is not only that dirt and disorder are the results of darkness; a great remedy is lost. Sunshine is the remedy lost, and the loss is momentous. Sunshine diffused through a

room warms and clarifies the air. It has a direct influence on the minute organic poisons, a distinctive influence which is most precious, and it has a cheerful effect upon the mind. The sick should never be gloomy, and in the presence of the light the shadows of gloom fly away. Happily, the hospital ward, notwithstanding its many defects (and it has many), is so favored that it is blessed with the light of the sun whenever the sun shines. In private practice the same remedy ought to be extended to the patient of the household, and the first words of the physician or surgeon on entering the dark sick room should be the dying words of Goethe: "More light, more light!"—Dr. B. W. Richardson.— *Tenn. Health Bulletin.*

CHOLERA PROPHYLAXIS IN ITALY.

Among the nations of the Continent, Italy has hitherto been conspicuous for her belief in quarantine and sanitary cordons as the most effective means of averting cholera from her shores. And even now, when their efficacy has been shown, by her highest hygienic authorities, to be more than doubtful, she continues to favor them if only for the "sense of security" they give to her uninstructed populace. Concurrently, however, with these traditional, if not exploded, measures, she is developing activity in a far more promising direction—that is, in a vigilant censorship of the food-supply. For years past the meat, the vegetables, and the alcoholic beverages have been, in many large towns throughout the peninsula, sold to the poorer classes when in a state unfit for consumption; but, thanks to the new Sanitary Code, the public health officers have been most stringent in the exercise of the powers given them by that enactment for the confiscation of such articles, and the punishment of their vendors. How far the evil had been allowed to go may be inferred from the fact that one can hardly open an Italian newspaper without coming on one or more announcements of the sequestration of food or liquor stores, which, if permitted to be sold, must have injured the health of the consumer. The *Opinione*, for example, a leading Roman journal, tells us that in one fortnight the Officio d'Igiene has sequestrated in that city 245,300 chilograms of fish, 1,742 of vegetables, 2,750 of fruit, and 32,700 of mushrooms, while the tradesmen in whose shops these articles were on sale have had their names and addresses published in the most conspicuous fashion possible. Similar seizures of confectionery and fancy beverages, such as are largely consumed throughout Italy in the summer season, are also reported in a Florentine journal—the *Nazione*—again with the names and addresses of the fraudulent vendors. All this should have a salutary effect on the Italian poorer classes, not only in view of cholera invasion, but of the maintenance of health at a high standard. In the memorable visitation of cholera in 1884, the ravages it made among the Neapolitan proletariat were distinctly traced not only to panic, but, primarily, to the unsound macaroni and the putrid vegetables, which made them "candidates" for the disease. Now this source of danger is in a fair way of being minimised—all the more that, as we see from an official rescript, the *personnel* of the sanitary office is being rigidly supervised, so as to obviate the temptation not unknown in poor countries—of the enforcer of the law conniving, for a "consideration," at breaches of the same. Italy, indeed, is doing now what she should have done long ago, and will reap the reward, not only of keeping epidemics at bay, but of receiving a larger measure of that tourist population whom her backward hygienic system has hitherto tended to warn off.—*Lancet.*

THE INTERNATIONAL CONGRESS FROM AN ENGLISH STANDPOINT.

In a leading editorial in the *British Medical Journal* of August 16, there occurs the following reference to the recent Congress at Berlin:

"*Congressus haud impar*—Berlin has had to sustain the stress of a gathering of medical men of all nations, in numbers hitherto unprecedented. They invaded the metropolis of the German Empire in hosts from every part of the world. They came; they saw; and they admired. Nothing could have exceeded the overflowing hospitality, the generous and cordial welcome, the thoughtful courtesy, and the minutely elaborate preparations with which the social and scientific needs of the invading hosts were met. All were alike made to feel this welcome; so that whether for its remarkable assemblage of the most eminent representatives of cosmopolitan medical science, or for its endless round of scientific and social activity, the Berlin Congress must be pronounced to have far exceeded any which has preceded it; and it will certainly be difficult in the future for any capital to surpass the feat which Berlin has accomplished."

THE MEDICAL CHARITIES IN EDINBURGH.

A series of elaborate articles have appeared within the past week in the *Scotsman* on the Charities of Edinburgh. These are dealt with in great detail, and compared with similar reports published twenty-five years ago in the same paper. The charities first treated are the medical charities, and some of the results are sufficiently startling to be worth noting here. The sum annually spent in healing the sick in Edinburgh amounts to £45,000, irrespective of the sum paid for the support of the City Hospital for Infectious Diseases. The most startling result of the investigations upon which these articles are based is the number of persons who receive gratuitous medical advice from the city medical charities, the number reaching a total of rather over 103,000 persons, and this in a population a little over 236,000. The articles recommend that additional precautions should be taken to prevent persons availing themselves of such gratuitous help who are quite able to help themselves. At present the principle upon which most of the institutions are conducted is to help whoever presents himself, without asking any questions. And the writer fairly remarks that the temptation to abuse help so readily given is very great, and that it is not altogether wonderful that the numbers are large, especially when, owing to the amount of medical teaching done in Edinburgh, there is always a certain demand for patients. It is almost needless to state that this represents an enormous amount of gratuitous service by the profession.—*Lancet.*

PRACTICAL NOTES.

THE USE OF BUTTERMILK IN VOMITING.

Dr. Stanley M. Ward writes in the *Therapeutic Gazette* that he has found fresh buttermilk very serviceable in relieving vomiting of various forms, even at times the vomiting of pregnancy. The remedy is administered ice cold, in doses of about half a teaspoonful repeated every fifteen or twenty minutes. In the case of children with cholera infantum he has often succeeded in quieting the stomach by interdicting everything else and using a few drops of fresh ice-cold buttermilk at intervals varying in length according to the severity of the case.—*Medical Record.*

METHOD OF APPLYING ANTISEPSIS IN THE TREATMENT OF RECENT ANTERIOR URETHRITIS.

Dr. J. William White has obtained the best results in this disease by frequent injections with a large syringe of a solution of sulpho-carbolate of zinc (10 grains to the ounce of the mixture) in a 10 to 15 per cent. lotion of peroxide of hydrogen. In addition to this treatment, or often entirely omitting local treatment, six to eight capsules a day were given by the mouth, each containing:

Salol, 3½ grains.
Oleoresin of cubebs, 5 grains.
Para balsam of copaiba, 10 grains.
Pepsin, 1 grain.

Of fifty-three cases of recent urethritis thus treated, and of all grades of severity, a distinct and unmistakable effect was produced upon the discharge in every instance but two, in which a violent indigestion prevented a thorough trial of the capsules. In about two-thirds of the whole number the discharge almost or entirely disappeared during the first week after treatment was begun. In but one case of the whole number did gonorrhœal rheumatism develop. This was especially noteworthy in three cases which had never before been free from joint trouble during an attack of gonorrhœa.—*Medical News.*

LYSOL.

At a meeting of the Society of Physicians of Vienna, May 23, 1890, Dr. V. Gerlach spoke of a new disinfectant, lysol, derived from tar oils by boiling with alkalies and fats. Comparative tests as to the germicidal powers of lysol, carbolic acid, sulphurous acid, and creolin upon the spores of anthrax bacilli, the staphylococcus pyogenes, and cocci of erysipelas, showed the former to be possessed of special advantages. Lysol appears to be perfectly innocuous, and has been administered subcutaneously to rabbits in amounts of half a drachm daily during fourteen days without causing death. It has been successfully employed in surgical operations, and for vaginal and uterine irrigation. On wounds it has no irritant effects, but when applied to mucous surfaces in ½ per cent. solutions it causes slight transient burning. A 0.3 per cent. is sufficient to destroy all the organisms present in wounds within thirty seconds, and a 1 per cent. solution is a good general antiseptic. In 3 per cent. solutions, it has the properties of a soap, and acts as an excellent disinfectant of the hands.—*Wiener Medicinische Wochenschrift*, No. 22, 1890. *International Journal of Surgery.*

IODOFORM EMULSION IN THE TREATMENT OF COLD ABSCESSES.

In the Polish Journal, *Gazeta Lekarska*, Dr. R. Jassinski reports the results he has obtained in the treatment of cold abscesses with iodoform emulsion. He opens an abscess only when it has become "residual," that is, when the primary focus in the vertebral column has healed or is separated from the abscess cavity. He has used iodoform emulsion in eighty-six cases, with the following results. A certain number of abscesses healed after a single injection, others after two or more injections. In eleven cases the abscesses burst spontaneously after injection, and much pus, mixed with emulsion, escaped. Healing occurred without further surgical interference. In nineteen cases aspiration was impossible, owing to blocking of the trochar; the opening was therefore dilated, and the cavity washed out with a 3 per cent. carbolic acid solution. Iodoform emulsion was then injected, and the wound stitched up. Occasionally a drainage tube had to be inserted, and the injection frequently repeated. Dr. Jassinski has never seen symptoms of poisoning, though he has injected 180 grams of a 10 per cent. iodoform emulsion at once.—*British Medical Journal.*

ANTIPYRIN IN ERYSIPELAS.

Dr. Favre, of Fribourg, relates an unusually severe case of erysipelas, showing the high curative value of antipyrin. A woman, aged 30, suffered from facial erysipelas accompanied by somnolence, vomiting, constipation and high fever. In spite of the local application of cold, carbolic acid, itchthyol, corrosive sublimate, strips of adhesive plaster, etc., the morbid process gradually spread over the scalp, neck, chest, upper extremities, abdomen and buttocks. On the tenth day the administration of antipyrin was commenced, with the result that fever at once markedly decreased, the patient's subjective state greatly improved, and the erysipelas soon ceased to spread.

SOCIETY PROCEEDINGS.

Tenth International Medical Congress, Berlin, August, 1890.

DR. H. C. WOOD, of Philadelphia, delivered before the Congress

AN ADDRESS ON ANÆSTHESIA.

(*Concluded from page 376.*)

Clinical and experimental results, namely, the results of experiments made in the physiological laboratory upon the lower animal, and the results of experiments made in the amphitheatre upon the higher animal, man—are again concordant. Chloroform is much more inimical than ether to animal life. The cause of this singular fatality is not, however, chiefly the cardiac action of chloroform. Chloroform is more apt to cause cardiac arrest than is ether, but it is also much more prone than is ether to cause death by failure of the respiration. Almost invariably, when ether is withdrawn before the dog is absolutely in the grasp of death, recovery occurs; but over and over again have I noticed that although the chloroform was taken away whilst the respirations were still being maintained with regularity, the arterial pressure much above zero, and the pulse very apparent, yet the symptoms of cardiac and respiratory failure continued to increase until the fatal issue was reached.

It seems to me that certain general facts or principles in regard to anæsthesia must be considered as established:

1. That the use of any anæsthetic is attended with an appreciable risk, and that no care will prevent an occasional loss of life.

2. That chloroform acts much more promptly and much more powerfully than ether, both upon the respiratory centres and the heart.

3. That the action of chloroform is much more persistent and permanent than that of ether.

4. That chloroform is capable of causing death either by primarily arresting the respiration, or by primarily stopping the heart, but that commonly both respiration and cardiac functions are abolished at about the same time.

5. That ether usually acts very much more powerfully upon the respiration than upon the circulation, but that occasionally, and especially when the heart is feeble, ether is capable of acting as a cardiac paralysant, and may produce death by cardiac arrest at a time when the respirations are fully maintained.

6. Chloroform kills, as near as can be made out, proportionately three to five times as frequently as does ether, partly, no doubt, because it is more powerful in depressing the heart, but largely because it lets go its hold much less rapidly than does ether when inhalation ceases. Is it not possible that this "holding on" is because it is less volatile than ether, and can we not here get a hint why chloroform is less deadly in the South than in the North? The diffusibility of vapors or gases is in inverse proportion to the square of their densities, and the vapor of chloroform would certainly diffuse itself with far greater rapidity at 90° F. than at 70° F.

The comparative advantages and disadvantages of the two anæsthetics in practical medicine are so well known, that only one or two points seem to force themselves upon our present attention. I cannot see that the surgeon is justified in putting the life of the patient to unnecessary risk of chloroformisation, except under special circumstances. I believe, moreover, that much of the unpopularity of ether is due to its improper administration. It is so easy to embarrass the respiration seriously by the folded towel, as commonly used, that not only are the struggles of mechanical asphyxia almost invariably produced, but probably death itself sometimes caused. Especially is there danger of death being thus caused mechanically in the advanced stage of etherization, when the patient is too thoroughly etherized to struggle, and when the attention of the etherizer is, it may be, attracted by some novel and difficult operation. I confess myself to once having nearly killed a patient in this way.

A proper apparatus is certainly preferable to a folded towel. Various have been invented, but, as the time is short, I shall only mention one, which seems to me a practically perfect mechanism, although it is probably little known on this side of the Atlantic.

The inhaler invented by Dr. O. H. Allis is based upon the theory that the patient to be etherized should be supplied with a full abundance of air saturated with the vapor of ether. It consists essentially of a series of foldings of muslins on a wire framework, arranged almost like the gills of a fish, so as to allow the air to pass freely through, but everywhere come in contact with ether. It should be placed upon the face of the patient dry, and the ether gradually poured on from a bottle with a tight cork, pierced by two small glass tubes, one short for the entrance of the air, the other long, and reaching nearly to the bottom of the bottle for exit of ether. When properly used, the Allis inhaler practically does away with the sense of suffocation, and the consequent struggles which have made etherization alike so repulsive to patient and surgeon.

In order to determine the rapidity with which etherization can be produced by this inhaler, Dr. M. H. Wilson kept for me notes of thirteen consecutive cases in the clinic of the Jefferson Medical College Hospital in Philadelphia. The average time required for the production of complete unconsciousness was 8 minutes. The average time during which anæsthesia was fully

maintained was 32 minutes; and the average amount of ether used during this time was 7½ ounces. In twenty-one surgical cases occurring this spring in the clinical service of Professor J. William White, of the University of Pennsylvania, the average time for the production of complete anæsthesia with ether, used through Allis's inhaler, was 7⅞ minutes. The results arrived at in these two clinics are so close that 8 minutes must be considered as the average time required for full etherization by this apparatus.

In discussing the treatment of the accidents of anæsthesia, the results obtained at the bedside naturally press forward for careful consideration; but in going over the subject from this point of view, I have found so little that was novel, and so little that was satisfactory to myself, that I shall not occupy the time of this Congress with any conclusions drawn from reported cases, or personal experience in chloroform accidents. I do not think myself that the problem can be solved by any such study of cases. Death is so near and so terrible, time so absolute, moments so important, that no surgeon would be willing or justified in waiting for the effect of any one remedy; and when a man is dosed with alcohol, nitrite of amyl, hypodermic injections of ether, digitalis, atropine, and other powerful agents; faradised, slapped, douched, stood on his head, subjected to chest movements for artificial respiration, and various other measures too numerous to mention; who can tell, if by chance he recover, why he has done so? or who can point out, if by chance he die, what is the remedy whose omission or commission has led to the fatal result?

The problem is a very complex one, not to be worked out amidst the excitement and responsibilities of the amphitheatre. Only in the physiological laboratory can its various elements be separated and studied each by itself, without regard to the individual life which is at stake.

In the physiological laboratory two distinct paths open, each promising to lead to some positive knowledge. We may, on one hand, enter upon the study of the minimum fatal dose of the anæsthetic, and of the results by consentaneous or subsequent administration of its supposed physiological antagonist; or we may investigate the effect of remedies upon functions that are failing under the influences of the anæsthetic.

The objections to the first of these methods have been, in the present instance, overwhelming. The accidents seem to be independent of the amount of anæsthetic inhaled; and such a method of investigation would have required far more time than was available after I had had the honor of being asked to address this body. Death is produced by chloroform and ether through paralysis of the respiration and the heart, and the method of experimental study which I have employed consisted in a study of the action of powerful agents upon these functions when oppressed by chloroform. I have selected chloroform chiefly because it is the more powerful agent of the two anæsthetics, and the more certain in its lethal results.

The experiments have all been made upon dogs, by one plan. The carotid artery and also the trachea, having been connected with a recording drum, so that the movements of the circulation and the respiration could be consecutively recorded, the animal was anæsthetised, and when the blood pressure had fallen almost to zero, and the respiration had ceased, or nearly ceased, as the case might be, the remedy to be tried was injected into the jugular vein, through a canula which had been previously inserted.

The more important remedies which have been used by clinicians for the averting of threatened death during anæsthesia are ether, alcohol, ammonia, nitrite of amyl, digitalis, atropine, and caffeine, alterations of position, and artificial respiration.

Although, at least in America, hypodermic injections of ether have been frequently employed even in ether accidents, such use is so absolutely absurd that it does not seem to me to require any experimental evidence as to its futility. Ether in the blood acts as ether, whether it finds entrance through the lungs, through the rectum, or through the cellular tissue; and the man who would inject ether hypodermically into a patient who is dying from ether, should, to be logical, also saturate a sponge with the ether and crowd it upon his unfortunate victim.

Instead of simply stating the results obtained in my experiments, I have thought it would be more interesting to show reproductions from some of my tracings. The first drug that I shall report upon is caffeine. I have injected it during the cardiac failure produced by chloroform, in doses varying from 3 to 7½ grs., and have never been able to perceive any distinct alteration in the arterial pressure, and no consistent distinct change of the pulse either in number or force. So far as the experiments go, they certainly indicate that the drug has no influence upon the heart that is being overpowered by chloroform. I may also state here, that it is not possible in any of my tracings to make out any influence exerted by caffeine upon the respiration.

With atropine, I have made a few experiments, the results being almost as negative as with caffeine. Ten cubic centimetres of a 2 per cent. solution of the atropine injected into the jugular vein of a chloroformed animal, altered the rate of the pulse beat, but had no apparent effect or influence upon the arterial pressure, or upon the respiration, and in no wise prevented final cardiac arrest.

Of all drugs, that which I think is most relied upon by clinicians as a cardiac stimulant in anæs-

thesia, as in other cases of heart failure, is alcohol. The chemical and physiological relations of alcohol to ether and chloroform are, however, so close, that many years ago I became very doubtful of the value of this drug as a stimulant to a heart depressed by anæsthesia.

These doubts continually grew stronger from what I saw and read as to the effects of the administration of alcohol during anæsthesia, and were finally changed into conviction by the experiments of R. Dubois,[1] who found that in the animal to which alcohol had been freely given, much less chloroform is required than in the normal animal, to anæsthetize or to kill; or, in other words, that alcohol intensifies the influence of chloroform and lessens the fatal dose.

In my own experiments with alcohol an 80 per cent. fluid was used, diluted with water. The amount injected into the jugular vein varied in the different experiments from 5 to 20 cubic centimetres, and in no case have I been able to detect any increase in the size of the pulse, or in the arterial pressure, produced by alcohol, when the heart was failing during advanced chloroform anæsthesia. On the other hand, on several occasions the larger amounts of alcohol apparently greatly increased the rapidity of the fall of the arterial pressure, and aided materially in extinguishing the pulse rate.

The effects of ammonia upon the failing heart of chloroform anæsthesia have been in my experiments uncertain; sometimes distinct, although very fugacious, and sometimes imperceptible. Twenty cubic centimetres of a 10 per cent. solution of aqua ammoniæ fortior (United States Pharmacopœia), in some instances produced an immediate rise in the arterial pressure, and even fugaciously registered itself in the respiratory rate, but perhaps more frequently it failed in its influence.

The influence of injections of digitalis has been in a number of experiments very pronounced in producing a persistent gradual rise of the arterial pressure, with an increase in the size of the individual pulse rate. In several instances death was apparently averted by its injection, and I saw in one or two cases, where large amounts of the digitalis had been employed, sudden systolic cardiac arrest, indicating that digitalis, if in sufficient amount, is able to victoriously assert itself in opposition to chloroform. Moreover, when I have given chloroform to dogs whose hearts were already under the influence of digitalis, there has seemed to be a peculiar steadying or sustaining power combating the circulatory depression naturally produced by the anæsthetic, and I believe that in all cases of weak heart in man, a full dose of digitalis before the administration of chloroform would greatly lessen the danger of cardiac collapse.

[1] Progrès Méd., 1883, xi, 951.

With the nitrite of amyl four experiments were made; in some of these from 4 to 10 drops of the nitrite of amyl were injected in the jugular vein; in others the nitrite was used by inhalation. No distinct effect upon the arterial pressure was in any instance produced, and usually no alteration in the size of the pulse waves, although sometimes the pulse did appear to be a little fuller.

Of all my experimental results, those which have been reached with strychnine have been the most surprising. The injection of strychnine into the jugular vein usually produced a gradual rise of the arterial pressure, and always caused an extraordinary and rapid increase in the rate and extent of the respiration. Thus I have seen the respiration, which had practically ceased for ten seconds, suddenly, under the influence of an injection of $\frac{1}{75}$ of a gr. of strychnine, become at once very large and full, and reach a rate of 130 a minute.

A series of elaborate experiments made upon the effect of the change of position of the animal on the blood pressure in the carotid and other arteries, has very clearly proved that the body of the animal whose circulation has been paralyzed by chloroform acts in a measure like a tube filled with fluid. Thus, if the feet of the dog were raised vertically above the head, whilst the latter remained upon the table, an immediate rise of pressure occurred, even though the heart had ceased beating entirely; provided that the head of the animal was kept upon a level with the table. If, however, the head of the animal was depressed below the level of the table for a distance equal to, or greater than the length of the body of the animal, a decrease of the arterial pressure occurred at once, although the animal was in a vertical position. The phenomena observed were precisely such as would have been produced if the canula had been inserted into a tube filled with fluid, instead of the carotid artery, and the elevation and depression of this tube had registered itself on the recording drum, in obedience to the ordinary laws of hydrostatics. The phenomena were entirely independent of any beat of the heart, and were readily produced when the animal was dead, provided the death had not occurred too long previously. Sometimes, even a very few minutes after the cessation of the heart beat, it was impossible to produce the changes of pressure on the drum. This I believe to have been due to coagulation of the blood occurring very early after death to a sufficient extent to interfere with the liquid properties of the fluid. In no case was any effect upon the respiration produced by change of position in the animal. In a number of cases, however, when the feet were elevated, the heart, which had entirely ceased beating, recommenced its work, and I have several times seen a pulse entirely disappear when the animal was taken from the vertical to the

horizontal position. On the other hand, very frequently it was impossible to affect the cardiac action by changing the position of the animal. Nevertheless, the phenomena spoken of occurred too frequently to be a mere outcome of chance, though I several times noted that the heart was usually more affected by alternately elevating and depressing the feet of the animal than by keeping it in a steadily elevated or horizontal position.

When the circulation has practically ceased, under the depressing influence of an anæsthetic, inverting the body must cause the blood which has naturally collected in the enormously relaxed vessels of the abdomen, to flow into the right side of the heart and distend it, and this distension—this increase of pressure—appears at times to have a sufficient momentary influence to stimulate the failing organ.

The theory which has been advocated by some therapeutists—that inversion of the body is of value in the accidents of anæsthesia, because it causes the vital centres of the brain to be supplied with blood—is probably incorrect. The respiration in anæsthesia fails, not through want of blood in the respiratory centres, but because the blood contains a poison which paralyzes these centres.

The most remarkable results which I have reached in bringing about recovery of animals to all ordinary intents and purposes dead, were obtained through the use of artificial respiration. Thus, I have seen an animal, in which no respiratory movements whatever had taken place for two minutes, and in which, during that time, no movements of blood had occurred in the carotid artery, and in which, therefore, the heart had ceased its beat, rapidly and permanently restored by artificial respiration.

At one time in these researches, it appeared as though after any dose of chloroform by inhalation, the animal could be resuscitated by artificial respiration, even though heart and lungs were completely paralyzed by the drug; but finally I did find a case in which artificial respiration failed.

The results of my experiments with the lower animals may be summed up: that nitrite of amyl, caffeine and atropine are of little or no use in chloroform poisoning; that alcohol, when given in small amounts, has no influence, but that when given largely, materially assists in paralyzing the heart and producing fatal results; that ammonia has some little influence upon the heart, but that of all substances tried, digitalis was by far the most powerful in stimulating the failing circulation; indeed, my experimental results indicate that it is the only known drug which is of any real practical value in such cases. Next, or perhaps even before digitalis, strychnine seems to be of value in the accidents of anæsthesia, because, whilst having some influence on the circulation, it affects powerfully the respiration. For many years chloroform has been used in practical medicine as the physiological and practical antagonist to strychnine, and it seems rather odd that strychnine should never have been employed as the practical antagonist to chloroform.

The one measure which in practical value far surpassed all others for the restoration of the dying animal was artificial respiration, and I have no doubt that a great majority of the deaths which have occurred in man from anæsthesia might have been avoided by the use of an active artificial respiration. The difficulty with artificial respiration, as it has been hitherto practiced upon man, after the Sylvester or other methods, is its inefficiency; whereas the artificial respiration which I used on animals was very active, indeed, much more efficient that natural breathing in causing circulation of air through the lungs, and therefore in removing excess of the anæsthetic from the residual air of the lungs and from the blood.

The use of what may be called "forced" artificial respiration by the physiologist, so naturally suggested a similar practice in man, that the celebrated John Hunter invented for the purpose an apparatus which consisted of a bellows so constructed that when it was extended one compartment drew in air from the lungs, whilst the other drew air from the atmosphere; and when it was closed the process was reversed, the fresh air being thrown into the lungs, the foul air into the atmosphere. In 1867, Richardson, of London, invented an apparatus more elegant and portable, although indentical in principle with that of John Hunter's; but I have not found that either Hunter or Richardson treated by forced artificial respiration an actual case of disease or poisoning. In 1875,[2] Dr. John Ellis Blake reported a successful case of aconite poisoning, in which life was apparently saved, although there was no pulse for over three hours, by artificial respiration, with the use of oxygen. In this case Marshall Hall's method was at first used, but later, a small rubber tube was connected directly with a copper reservoir of condensed oxygen, the other end of the tube terminating in a small nozzle, which was inserted in one nostril. Four hundred gallons of oxygen were thus used, but how far the force of the compressed gas was employed to dilate the lungs is not very clear; and it is doubtful whether this case should be considered as one of forced respiration. The first physician to use forced respiration in actual human poisoning, with a clear idea of its value and power, so far as my reading goes, was Dr. George E. Fell.[3]

It is plain that the bellows constructed by John Hunter and by Richardson are unnecessarily complex and faulty in principle. There is no need whatever of drawing the air out of the fully-

[2] Boston Med. and Surg. Journal, vol. xxi.
[3] International Medical Congress, Washington, 1887.

filled lungs. Every physiologist knows that when the muscular system is completely paralyzed by curare or even by death, the chest walls have sufficient elasticity to force air out of the lungs, and all ordinary laboratory apparatus for artificial respiration is based upon this fact. For forced artificial respiration in man, an ordinary bellows of proper size is all that is required for the motive power.

The real difficulty—the point to be especially investigated and studied—is as to the connection between the bellows and the lungs. Hunter and Richardson simply placed a tube in one nostril, closing firmly the other nostril and the mouth of the subject.

Dr. Fell at first used a tracheal tube, the insertion of which, of course, necessitated the performance of tracheotomy. In one case, however, a simple mask covering the mouth and nostrils was a perfect success. I have had no opportunity of trying the apparatus on the living, but have made a series of experiments upon dead bodies, which have demonstrated that usually a face mask is all that is necessary for the performance of artificial respiration. Before using the mask, the tongue should be well drawn forward, and, if necessary, fixed in this position by an ordinary piece of silk suture run through it, which can be held in the hand of the operator. If in any individual case the mask fails, an intubation tube may be introduced into the larynx. I do not believe it will ever be found necessary to perform a tracheotomy.

Dr. Fell's apparatus consists of a pair of foot-bellows by which air is forced into a receiving chamber, which is connected with an apparatus for warming the air, and a valve which can be opened and shut by a movement of the finger. This valve in turn leads to the tracheal tube. When the valve is opened the air rushes through the chamber into the lungs and expands them; the finger is lifted, the valve shuts, the lungs contract; and so the respiration goes on. I have no doubt that this apparatus is efficient in practice, but it is open to the serious objection of being unnecessarily complex and costly.

A much simpler, cheaper, and probably equally efficient apparatus may consist simply of a pair of bellows of proper size, a few feet of india-rubber tubing, a face mask, and two sizes of intubation tubes. There should also be set in the tubing a double tube, with opening similar to that commonly found in the tracheal canula of the physiological laboratory, so that it is in the power of the operator to allow for the escape of any excess of air thrown by the bellows. This whole apparatus can be prepared at a very trifling expense, and it seems hardly necessary to point out its probable value in various narcotic poisonings, and other accidents, in which death is produced by a paralysis of the respiratory centres of temporary nature. The proper use of it—at least with the face mask—could be taught to persons without special medical skill, so that it not only ought to form a part of the surgeon's outfit, but might be of great service in life-saving stations, about gas works, etc.

In conclusion, I may be allowed to state that if the results and deductions arrived at in this address are, as I believe, correct, the rules for the proper treatment of accidents during anæsthesia can be summed up in a very few words:

Avoid the use of all drugs, except strychnine, digitalis, and ammonia.

Give the tincture of digitalis hypodermically.

Draw out the tongue, and raise up the angle of the jaw, and see that the respiration is not mechanically impeded.

Invert the patient briefly and temporarily.

Use forced artficial respiration promptly, and in protracted cases employ external warmth and stimulation of the surface by the dry electric brush, etc., and, above all, remember that some at least, and probably many, of the deaths which have been set down as due to chloroform and ether have been produced by the alcohol which has been given for the relief of the patient.

DOMESTIC CORRESPONDENCE.

The New York State Examining Board.

To the Editor:—Dr. William Warren Potter—who gives his own name and address so fully that it is unnecessary for me to reciprocate the favor which he does me in that respect—apparently misapprehends both the intention of my criticism and the provisions of the Act which he defends, inasmuch as he confines the principal part of his argument to the function of the State Medical Society in "nominating to the Regents of the University one of the boards of medical examiners to be created," whereas my objection concerned the decree that this board shall be "composed exclusively of members of the same medical society."

I am aware of the distinction which Dr. Potter so clearly draws between "members" and "delegates" (although he subsequently confuses them altogether as members), and I am also aware that eligibility to membership is a very different thing from membership, as but two per annum out of the many "eligibles" could be elected until recently. Accepting Dr. Potter's statement that there are now 229 members, the Act declares that from what I must still call "a small circle" must be "exclusively" appointed the examining board to represent the regular medical profession.

Furthermore, I entertain strong doubt of the safety of the assertion that a quorum of members

and delegates can be trusted to speak for a constituency of "upwards of 4,000 physicians." They certainly did not so speak when, in 1882, without preliminary warning to the profession, fifty-two of them enacted a "new code" of ethics, cutting the society loose from the national Association, with the result of eliciting protests from forty out of the sixty county societies. They were not so speaking in 1884, when, out of 5,002 physicians, but 1,040 expressed themselves in favor of this "new code." Nor are they more entitled so to speak to-day.

THE JOURNAL'S "editorial commendation" was, I suspect, misapplied to the society in question by a *lapsus pennæ*, and intended for the New York State Medical Association, founded for the maintenance of the national code of ethics, since its "plan of organization" alone provides the system of district branches which was commended.

ALFRED L. CARROLL.

30 West 59th street, New York.

NECROLOGY.

J. W. Heron, M.D.

Dr. J. W. Heron, a medical missionary and superintendent of the Royal Hospital of Korea, died at Seoul, the capital of that country, on July 31, of dysentery. Dr. Heron is said to have enjoyed, in a peculiar degree, the confidence of the king and of the foreign colony.

MISCELLANY.

INSANITY IN ENGLAND.—The report of the English commissioners in lunacy states that the total number of lunatics, idiots, and persons of unsound mind under official cognizance in England and Wales on January 1st last was 86,067, being an increase of 1,727 as compared with January 1, 1889.

LETTERS RECEIVED.

Dr. John Casson, Alexia, La.; Julia H. Murphy, Mercer, Pa.; Dr. W. M. Lewis, Greensburg, Ky.; Dr. W. C. Townes, Chattanooga, Tenn.; Miner & Elbreg, Indianapolis; Dr. G. F. Cook, Oxford, O.; Dr. H. Durand, Paris, France; Dr. C. G. Cannaday, Roanoke City, Va.; Dr. W. F. Rochelle, Jackson, Tenn.; Dr. Edw. A. Sawyer, Gardner, Mass.; Dr. A. F. Walter, Gladbrook, Ia.; Dr. J. C. Lange, Pittsburgh, Pa.; Dr. T. G. Horn, Colorado Springs, Col.; W. D. Kline, Nashville, Tenn.; Dr. Chas. H. Shepard, Brooklyn, N. Y.; J. F. Madden, New York; Dr. R. S. Brice, Keota, Ia.; Dr. E. Pynchon, R. G. Dun & Co., Chicago; Dr. John P. Stoddard, Muskegon, Mich.; Miss Kennedy, Allegheny, Pa.; Jas. Black, Denver, Col.; Dr. Bullard, Columbus, Ga.; Dr. J. G. Meachem, Racine, Wis.; Lea Bros. & Co., Philadelphia; Dr. W. S. Watson, Matteawan, N. Y.; Dr. C. A. Eastman, Winthrop, Mass.; Dr. J. B. Mattison, Brooklyn, N. Y.; The Mutual Life Ins. Co., New York; Canton Surgical and Dental Chair Co., Canton, O.

Official List of Changes in the Stations and Duties of Officers Serving in the Medical Department, U. S. Army, from August 30, 1890, to September 5, 1890.

First Lieut. Theodore F. DeWitt, Asst. Surgeon U. S. A., is granted leave of absence for one month, to take effect September 15, 1890. S. O. 76, Hdqrs. Dept. of Texas, San Antonio, Tex., September 1, 1890.

APPOINTMENT.

Col. Jedediah H. Baxter, Chief Medical Purveyor, to be Surgeon-General, with the rank of Brigadier-General, August 16, 1890. Vice Moore, retired from active service. A. G. O., Hdqrs. of the Army, Washington, September 1, 1890.

Official List of Changes in the Medical Corps of the U. S. Navy for the Week Ending September 6, 1890.

Surgeon J. C. Wise, detached from Torpedo Station, and to the U. S. S. "Alliance."

Surgeon Paul Fitzsimons, ordered to the Torpedo Station, Newport, R. I.

Surgeon George A. Bright, detached from the U. S. S. "Constellation," and to Naval Academy.

Asst. Surgeon F. W. Olcott, promoted to be P. A. Surgeon, U. S. Navy.

P. A. Surgeon A. R. Wentworth requests to withdraw resignation—granted.

P. A. Surgeon M. H. Crawford, detached from the U. S. S. "Monongahela" and granted two months' leave of absence.

Asst. Surgeon James F. Keeney, detached from the U. S. S. "Richmond," and granted two months' leave of absence.

Asst. Surgeon Chas. H. T. Lowndes, detached from Naval Academy, and ordered to the U. S. S. "Richmond."

Official List of Changes of Stations and Duties of Medical Officers of the U. S. Marine-Hospital Service, for the Two Weeks Ending July 5, 1890.

Surgeon W. H. H. Hutton, ordered to Washington, D. C., for special duty. June 23, 1890.

Surgeon W. H. Long, granted leave of absence for thirty days. July 2, 1890.

Surgeon H. W. Austin, when relieved at Chicago, Ill., to report in person to the Supervising Surgeon-General. July 5, 1890.

Surgeon Fairfax Irwin, to proceed to Biloxi, Miss., on special duty. July 2, 1890.

Surgeon F. W. Mead, relieved from duty at St. Louis, Mo., to assume command of the Service at Chicago, Ill. July 5, 1890.

P. A. Surgeon S. T. Armstrong, granted leave of absence until August 7, 1890. June 24, 1890.

P. A. Surgeon P. C. Kalloch, relieved from duty at San Francisco, Cal., to assume command of the Service at St. Louis, Mo. July 5, 1890.

Asst. Surgeon T. B. Perry, granted leave of absence for ten days. July 2, 1890. Upon expiration of leave, to proceed to Norfolk, Va., for temporary duty. July 5, 1890.

Asst. Surgeon J. O. Cobb, to proceed to St. Louis, Mo., for temporary duty. July 5, 1890.

Asst. Surgeon B. W. Brown, to proceed to San Francisco, Cal., for temporary duty. June 23, 1890.

RESIGNATION.

P. A. Surgeon S. T. Armstrong, resignation accepted, by direction of the President, to take effect August 7, 1890. June 24, 1890.

APPOINTMENT.

Asst. Surgeon B. W. Brown, commissioned as an Asst. Surgeon by the President. June 23, 1890.

OMITTED FROM PREVIOUS LIST.

Surgeon P. H. Bailhache, to proceed to Eureka, Cal., and Astoria, Ore., as inspector. June 5, 1890.